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CONTENTS

A Traffic Flow Prediction Algorithm Using BP Neural Network and IGA

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Abstract: In order to make the traditional BP neural network algorithm suitable for medium-term traffic flow prediction, a traffic flow prediction algorithm based on improved BP neural network is proposed. The algorithm uses improved genetic algorithm to optimize the deep BP neural network, and it performs several experiments under different conditions of the number of hidden layers, the number of input nodes and the number of hidden layer nodes. From the two aspects of prediction accuracy and computational efficiency, the optimal neural network structure for medium-time traffic flow prediction is obtained. Simulation results show that the proposed algorithm can be used in medium-term traffic flow prediction and the overall accuracy rate can be more than 80%.
Keywords: Deep learning; BP neural network; Improved genetic algorithm; Traffic flow prediction

1. INTRODUCTION

Research on traffic flow prediction is mainly divided into short-term traffic flow prediction, medium-time traffic flow prediction, and long-term traffic flow prediction [1]. Among them, the short-term traffic flow prediction and medium-time traffic flow prediction are mainly applied in the field of traffic guidance, and long-term traffic flow prediction is more biased towards traffic planning and other fields. For the short-term traffic flow prediction, the research in recent years has matured, and the medium-time traffic flow prediction is still in a process of exploration.

Traffic flow prediction is one of the important means to solve the problem of urban traffic congestion. Using more sophisticated prediction methods to achieve more accurate traffic flow prediction is the key to this study. The short-term traffic flow prediction and medium-time traffic flow prediction use various detection devices to obtain traffic flow information, then they can predict future road condition information through algorithms. The purpose of short-term traffic flow prediction is mainly to enable users to adjust the route in real time, while the purpose of medium-time traffic flow prediction is more predicated on the query of road conditions before travel, which can facilitate the user to better plan the travel route and save travel costs [2].

The main methods of traffic flow prediction can be roughly divided into two major categories: parametric methods and non-parametric methods. Among them, the parametric methods are more mature, such as the autoregressive moving average model (ARMA), the autoregressive integrated moving average model (ARIMA), the nonlinear regression model and the Kalman filter model [3]. Non-parametric methods have shown great potential in the field of prediction in recent years, including non-parametric regression methods, neural network models, decision tree models, and support vector machines [4]. Compared with other prediction methods, artificial neural network has strong robustness and parallel information processing capabilities, and it is very suitable for predicting traffic flow [5].

In this paper, the improved genetic algorithm (GA) [6] is used to optimize the deep BP neural network for the prediction model structure of medium-time traffic flow, and based on the velocity value of the coil traffic flow parameters for prediction and verification, it is proved that the model has better performance.

2. PREDICTION METHOD

BP neural network is a multi-layer feed-forward neural network. Its main characteristic is that the signal propagates forward and the error propagates back [7]. In the forward pass, the input signal is processed layer by layer from the input layer through the hidden layer until the output layer. If the output layer does not get the desired result, it goes to back propagation and adjusts the weight and threshold of the network based on the prediction error, so that the network continuously approaches the desired output. BP neural network is one of the most widely used artificial neural network models, and its prediction effect has also been verified by researchers [8]. However, a simple BP neural network can only process data by adjusting weights and thresholds, and it is easy to fall into the problems of local minimum value. It is necessary to further optimize the convergence speed and global optimization ability by using an optimization algorithm.

The BP neural network is usually divided into 3 layers: input layer, hidden layer, and output layer. The deep BP neural network is a BP neural network that adds multiple hidden layers on the basis of a single hidden

layer. The calculation of the input layer to the output layer are shown in equation (1) and equation (2), and the back propagation is performed by calculating the error, which is shown in equation (3) [9]:

$$H_j = f(\sum_{i=1}^{n} w_{ij} x_i - a_j) \quad j = 1,2,...,l \tag{1}$$

H_j represents the output of the hidden layer, f represents the excitation function of the hidden layer, n represents the number of input layer nodes, w_{ij} represents the connection weight between the input layer and the hidden layer, x_i represents the input value of neural network, a_j represents the implicit Layer threshold, l represents the number of hidden layer nodes.

$$Q_k = \sum_{j=1}^{l} H_j w_{jk} - b_k \quad k = 1,2,...,m \tag{2}$$

Q_k represents the predicted output, w_{jk} represents the connection weight between the hidden layer and the output layer, b_k represents the threshold of output layer, m represents the number of output layer nodes.

$$e_k = Y_k - Q_k \quad k = 1,2,...,m \tag{3}$$

Y_k represents the expected output, e_k represents prediction error.

Compared with the traditional neural network with a single hidden layer, the deep artificial neural network has strong generalization ability, high prediction accuracy, and superior feature learning capability. It is applicable to traffic flow prediction and other situations with complex mapping relationships [10-11].

2.1 Improvement of Genetic Algorithm

Genetic algorithm [12-13] can generate initial populations from the potential sample solutions of the problem, then it uses the evolutionary mechanism of the fittest survival and survival of the fittest in the natural world to generate simultaneous genetics through selection, crossover, and mutation. The new population with diversity and high fitness has a strong global search capability. However, there are many parameters to be determined and it is easy to obtain a local optimal solution. Therefore, this paper improves the traditional GA algorithm and adopts the adaptive crossover probability P_c and mutation probability P_m to generate new individuals. The formula is:

$$P_c = \begin{cases} k_1(f_{\max} - f')/(f_{\max} - f_{ave}) & f' \geq f_{ave} \\ k_2 & f' < f_{ave} \end{cases} \tag{4}$$

$$P_m = \begin{cases} k_3(f_{\max} - f)/(f_{\max} - f_{ave}) & f \geq f_{ave} \\ k_4 & f < f_{ave} \end{cases} \tag{5}$$

In the above two formulas, $f_{\max}$ represents the highest degree of fitness, f_{ave} represents the mean of fitness, f' represents the individual fitness of the crossover, f represents the degree of fitness of the individual which produces the mutation, k_1, k_2, k_3, k_4 represents the adjustment parameters, $0 < k_1, k_2, k_3, k_4 \leq 1$.

2.2 Improved Traffic Prediction Model Based on Improved Genetic Algorithm Combined with Deep BP Neural Network

The improved GA algorithm has good global search ability, it can effectively solve the shortcomings of BP neural network easily falling into local minimum value, so the two methods can be combined to predict the traffic flow state. The key point of using the improved genetic algorithm to optimize the deep BP neural network algorithm is to use the improved genetic algorithm to find the optimal solution of each weight and threshold of the deep BP neural network in the potential solution space to narrow the search scope of the optimal solution, and then repeated training through deep BP neural network to achieve optimal model parameters of the target. The concrete algorithm structure flow is shown in Fig. 1.

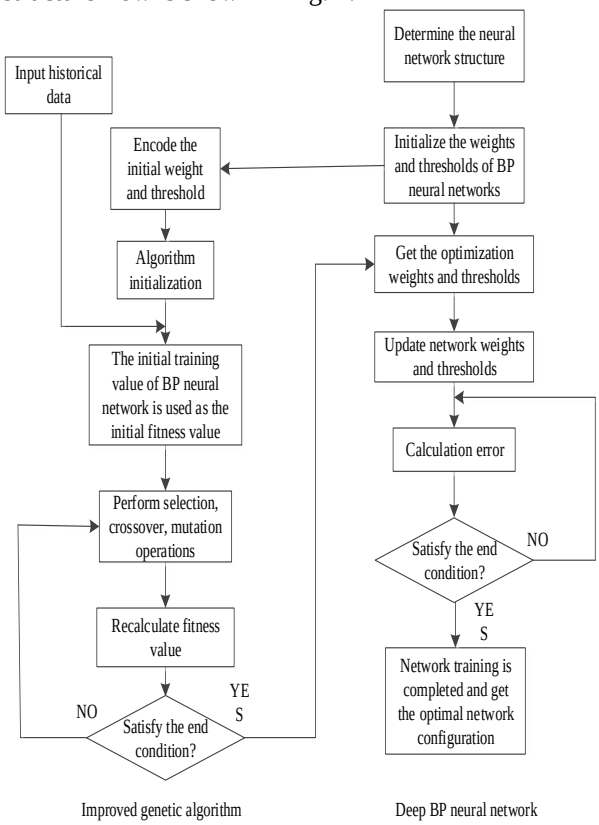

Fig. 1 Flow chart of using improved genetic algorithm to optimize the deep BP neural network

3. SIMULATION EXPERIMENT

3.1 Sources of Data

The data used in this simulation is data for 14 consecutive working days on a road section of a domestic highway in a domestic city. The raw data is the coil data by 20s, it is converted into data as the input of neural network every 15 min intervals. Specifically, the average speed of each raw data is averaged within 15 min to obtain the average speed every 15 min. If there are abnormal data in the original data (for example, the traffic is 0, the speed is not 0, etc.), the abnormal data will be removed.

3.2 Experimental Design

The simulation uses the MATLAB platform. The input parameters are the average velocity values arranged in time series at intervals of 15 minutes, and the output results are divided into three kinds of average velocity prediction values: 15 min, 30 min, and 45 min in the future. Set the number of individuals in the optimized genetic algorithm is 20, k_1=0.3 , k_2=0.5 , k_3=0.3 , k_4=0.5 . Perform several experiments under different conditions of the number of hidden layers, the number of input nodes and the number of hidden layer nodes and we can obtain the optimal neural network structure for medium-time traffic flow prediction.

As shown in Table 1, the number of different hidden layers is compared from the two indexes of prediction accuracy and operation time respectively. When the network structure and data are the same, the average value of the 10 prediction results is taken as the comparison data. Equation (6) represents Mean Relative Error (MRE) [14]. The smaller the value is, the closer the predicted value is to the true value.

$$MRE = \frac{1}{n}\sum_{i=1}^{n}\frac{|\Delta x_i|}{x_i} \quad i = 1, 2, ..., n \tag{6}$$

n is the number of prediction samples, Δx_i is the difference between the predicted value and the true value, x_i is the true value.

Table 1 Comparison of prediction results of different hidden layers

Types	MRE(%)	Accuracy(%)	Operation time (s)
One hidden layer	4.87	87.24	3.77
Two hidden layers	4.66	88.91	3.89
Three hidden layers	4.35	91.36	4.28
Four hidden layers	4.35	91.79	4.96

Through data comparison, for medium-term traffic flow prediction, as the number of hidden layers in the BP neural network increases, the prediction accuracy will be higher and the corresponding operation time will be longer. After comprehensively considering the prediction accuracy and operation time, the simulation experiment uses a 5-layer (3 hidden layers) BP neural network.

As shown in Table 2, the BP neural networks of different input nodes and prediction types are also compared from the two indexes of prediction accuracy and calculation time, and the average of the 10 prediction results is taken as comparison data.

The comparison results show that for a short time prediction (15 min), the number of input nodes has little effect on the prediction accuracy, sometimes more input nodes will lead to a decrease in accuracy and a significant increase in calculation time; and for longer time prediction (45 min), more input nodes can effectively improve the prediction accuracy, and the operation time will increase accordingly. Therefore, after considering both the prediction accuracy and the computational efficiency, the entire simulation experiment is divided into two parts: the first part is the prediction of 15 min, and the second part is the prediction of 45 min. In the first part we use 8 input nodes (the data in first 2h), in the second we use 96 input nodes (data for a full day).

Table 2 Comparison results of different input and prediction types

Types	MRE(%)	Accuracy (%)	Operation time (s)
Prediction of 15min (8 input nodes)	4.48	88.62	5.89
Prediction of 15min (96 input nodes)	4.95	85.77	11.14
Prediction of 45min (8 input nodes)	8.51	72.53	6.28
Prediction of 45min (96 input nodes)	7.08	78.29	11.27

The number of hidden layer nodes has always been a hot topic in neural network research. In addition to relying on long-term empirical formulas, the number of hidden layer nodes is determined through continuous experiments. The simulation first uses the following empirical formula to determine the approximate range of hidden layer nodes:

$$l = \sqrt{(m+n)} + t \tag{7}$$

In the formula, l is the number of hidden layer nodes, m is the number of input layer nodes, n is the number of output layer nodes, t is a constant between 0 and 10.

After determining the scope, the final number of hidden layer nodes is also determined from both the

prediction accuracy and the computation time. Table 3 is the comparison of the operation results of the first part (8 input nodes) with different hidden layer nodes. Table 4 is the comparison of the operation results of the second part (96 input nodes).

Table 3 Comparison results of the number of nodes in different hidden layers in the first part

Number of nodes	3	4	5	6	7
MRE(%)	4.14	4.12	4.17	4.49	4.38
Accuracy(%)	88.31	88.39	88.68	87.95	87.16
Operation time (s)	4.51	4.62	4.83	5.26	5.71

Table 4 Comparison results of the number of nodes in different hidden layers in the second part

Number of nodes	10	11	12	13	14
MRE(%)	7.33	7.46	7.91	8.25	8.49
Accuracy(%)	76.68	75.26	74.10	73.41	69.82
Operation time (s)	10.92	11.67	12.35	16.59	18.76

The results show that the prediction accuracy of the first part increases first and then decreases with the increase of the number of nodes, and the operation time continues increasing. The prediction accuracy of the second part decreases with the increase of the number of nodes, and the operation time increases substantially. Taken together, the first part is optimal when the number of nodes is 5, and the second part is optimal when the number of nodes is 10. Therefore, the first part of this simulation uses 5 hidden layer nodes, and the second part uses 10 hidden layer nodes.

3.3 Experimental Results

The Equality Coefficient (EC) reflects the fit between the predicted value and the true value. Generally, it is considered to be a better fit when EC is bigger than 0.9. Its expression is as follows:

$$EC = 1 - \frac{\sqrt{\sum_{i=1}^{n}(x_i - \hat{x}_i)^2}}{\sqrt{\sum_{i=1}^{n} x_i^2} + \sqrt{\sum_{i=1}^{n} \hat{x}_i^2}} \quad (8)$$

In the formula, n is the predicted number of samples, $\hat{x}_i$ is the predicted value, x_i is the true value.

Fig.2 shows the comparison between the true average speed and predicted average speed over the next 45 minutes.

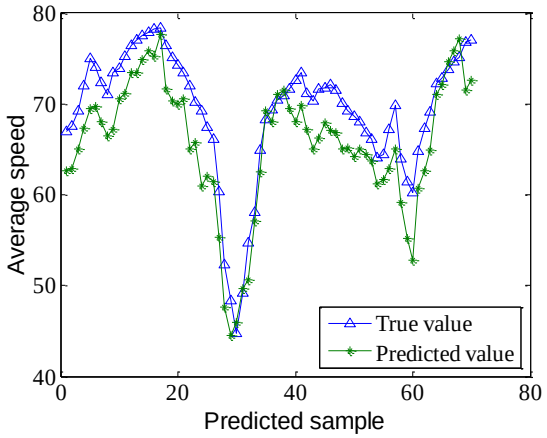

Fig. 2 Comparison of traffic speed prediction in the future 45 minutes

Table 5 shows the comparison of the specific forecasting accuracy indexes in different forecasting periods.

Table 5 Comparison of prediction accuracy indicators in different prediction periods

Prediction period	MRE(%)	Accuracy(%)	EC
15min	1.63	99.25	0.986
30min	2.29	95.86	0.982
45min	5.77	83.73	0.961

Simulation results show that with the prolongation of the prediction time, the prediction accuracy will also decrease, but the accuracy of the various prediction periods can be maintained at a relatively high level. In the first part, the predicted MRE is less than 2%, accuracy and EC are higher than 95% and 0.98. In the second part, although the prediction accuracy decreases, but the MRE can still be maintained at less than 6%, accuracy and EC are higher than 83% and 0.96. The simulation results show that the optimized deep BP neural network based on the improved genetic algorithm has higher prediction accuracy and lower error level, it can be used for medium-term traffic flow prediction.

4. CONCLUSION

In this paper, we use the deep BP neural network algorithm optimized by the improved genetic algorithm to study the traffic flow prediction in three different time periods in the next 45 minutes. The impact of the prediction accuracy and the forecasting efficiency on the number of hidden layers, the number of input nodes, and the number of hidden layer nodes are analyzed in detail and the optimal deep BP neural network structure configuration for medium-term traffic flow prediction is determined. The simulation results show that the proposed algorithm can predict the medium-time traffic flow and the overall accuracy rate can be more than 80%.

REFERENCES

[1]Gao Y, Liu W. Functional link artificial neural

network with cloud estimation of distribution algorithm for traffic flow forecast. International Symposium on Computational Intelligence and Design, 2017: 194-197.
[2]Li Q, Tao Y, Han Y, et al. The forecast and the optimization control of the complex traffic flow based on the hybrid immune intelligent algorithm. Open Electrical & Electronic Engineering Journal, 2014(8): 245-251.
[3]Sun S, Zhang C, Zhang Y. Traffic flow forecasting using a spatio-temporal bayesian network predictor. lecture notes in computer science, 2017(5): 273-278.
[4]Forcadel N, Salazar W, Zaydan M. Homogenization of second order discrete model with local perturbation and application to traffic flow. Discrete & Continuous Dynamical Systems - Series A (DCDS-A), 2016(37): 1437-1487.
[5]Luca M D, Žilionienė D, Gadeikis S, et al. Traffic pollution assessment using artificial neural network and multivariate analysis. Baltic Journal of Road & Bridge Engineering, 2017(12): 57-63.
[6]Yang H J, Hu X. Wavelet neural network with improved genetic algorithm for traffic flow time series prediction. Optik - International Journal for Light and Electron Optics, 2016(127): 8103-8110.
[7]Gen-Suo M I, Miao L, Niu Y X. Application of CPSO-BP neural network algorithm to city tram positioning. Journal of the China Railway Society, 2015(37): 67-72.
[8]Thomas T, Weijermars W, Berkum E V. Predictions of urban volumes in single time series. IEEE Transactions on Intelligent Transportation Systems, 2010(11): 71-80.
[9]Wang S, Zhang N, Wu L, et al. Wind speed forecasting based on the hybrid ensemble empirical mode decomposition and GA-BP neural network method. Renewable Energy, 2016(94): 629-636.
[10]Chen Y, Shu L, Wang L. Poster abstract: Traffic flow prediction with big data: A deep learning based time series model. Computer Communications Workshops. IEEE, 2017: 1010-1011.
[11]Lv Y, Duan Y, Kang W, et al. Traffic flow prediction with big data: a deep learning approach. IEEE Transactions on Intelligent Transportation Systems, 2015(16): 865-873.
[12]Bruant I, Gallimard L, Nikoukar S. Optimal piezoelectric actuator and sensor location for active vibration control, using genetic algorithm. Journal of Sound & Vibration, 2016(12): 173-192.
[13]Tavakkoli-Moghaddam R, Safari J, Sassani F. Reliability optimization of series-parallel systems with a choice of redundancy strategies using a genetic algorithm. Reliability Engineering & System Safety, 2017(93): 550-556.
[14]Li C, Cui N, Feng Y, et al. Adaptation evaluation for reference evapotranspiration methods in different regions of Sichuan. Transactions of the Chinese Society of Agricultural Engineering, 2016(32): 127-134.

Dynamic Rehabilitation Gesture Recognition Based on Optimal Feature Combination Tsne-BP Model

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Abstract: The LeapMotion sensor collects the motion data of the rehabilitation dynamic gesture, and extracts features such as palm coordinates, finger extensions, and finger angles. Back propagation (BP) neural network is used to discuss the influence of different feature combinations on the recognition rate of rehabilitation gestures and find the optimal feature combination. This paper proposes the Tsne-BP model, which effectively improved the recognition rate of rehabilitation gestures. The experimental results show that the optimal feature combination can fully characterize the dynamic rehabilitation gestures. The proposed Tsne-BP model can identify these gestures efficiently and the average recognition is accurate. The highest accuracy reached 99.7%.
Keywords: LeapMotion sensor; Dynamic rehabilitation gesture; Tsne-BP model

1. INTRODUCTION

At present, the rehabilitation treatment for the hand movement dysfunction patients is still based on the traditional training mode. But traditional training model of treatment is both single and limited, it is unable to meet the needs of most patients.

With the rapid development of science and technology innovation and computer information technology, the application of virtual reality (VR) technology in rehabilitation training has gradually attracted more and more public attention [1]. VR rehabilitation training is not limited by time and space, which can provide virtual forms of training model. Compared with the traditional way, it has the particular advantages in evaluation and treatment of motor dysfunction diseases. Moreover, it reduces the cost and economizes the time [2]. Rehabilitation treatment based on VR can build colorful virtual environment and design specific scheme of rehabilitation training. The research shows that the motor function and neural pathways recovered by patients with exercise in VR environment could be well displayed in real life. So more and more research groups explore this novel technology to take the place of the traditional model [3].

In this paper, a novel complex dynamic gesture recognition method based on Tsne-BP model is proposed after collecting data by LeapMotion and pretreating data. The influence of different feature combinations on the recognition rate of dynamic gesture was also discussed here. The experimental result confirms that optimal combination of features can effectively improve gesture recognition rate, and the proposed Tsne-BP model has strong robustness and high recognition rate for complex rehabilitation gestures.

2. REHABILITATION GESTURE DATA ACQUISITION AND FEATURE EXTRACTION

2.1 Introduction of LeapMotion

LeapMotion can trace the movement of ten fingers perfectly, and can reach the precision of 0.01mm. LeapMotion sensor tracks the hand movement at more than 200 frames per second using a right-handed cartesian coordinate system and the returned values are in millimeters. The right-hand coordinate system is shown in figure 1.

In this paper, LeapMotion sensor is utilized to obtain the information of hand bones and joints. The corresponding position of bones and joints of each part is reflected to the virtual hand in VR environment, where index finger is expressed by bone1, bone2 and bone3, its distal interphalangeal joint, proximal interphalangeal joint, and metacarpophalangeal joint are expressed by joint3, joint2 and joint1 respectively. Other positions are all Uniformly corresponding, as shown in figure 2.

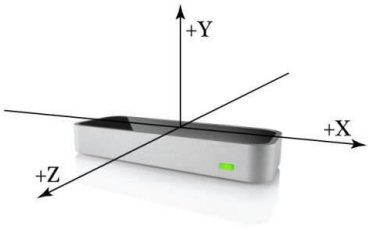


Figure 1 LeapMotion sensor

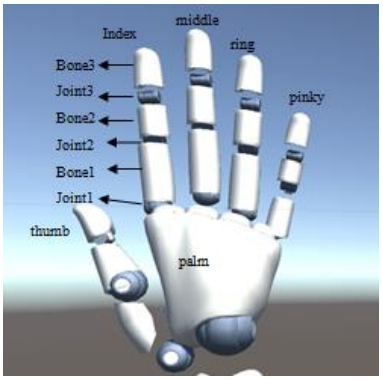


Figure 2 Virtual Hand

2.2 Rehabilitation Gesture Collection Method

Data set contains seven types of single-hand rehabilitation gestures that are collected by LeapMotion, the specific gestures are shown in Figure 3. Here, ⊘ indicates that the palm coordinate position remains unchanged, $\vec{Z}$ indicates that the palm moves in the positive direction of the z-axis during the movement.

Label	Gesture	Gestural Motor Process
1	Pinch-gesture	
2	Triangle-gesture	
3	Stretch gesture	
4	U-type gesture	
5	V-type gesture	
6	Make a fist	
7	Grasping motion	

Figure 3 Dynamic rehabilitation gestures

2.3 Feature Extraction of Gesture

The dynamic gesture data that collected by LeapMotion sensor is a set of time-series data. Which includes 3D position of each joint, bone, palm and fingertip of the hand. Seven kinds of gesture data are collected from 5 people in this environment, each people perform each gesture 10 times, so there are 350 samples in total. Feature of each frame includes:

(1) isExtended A_i, $i=1,2...5$, isExtended indicates whether five fingers are stretched or not. The feature type is Boolean.

(2) Fingertip-distances B_i, are the indicates the Euclidean distance between the fingertips and the palm center.

$$B_i = |F_i - C|, i = 1,2..5 \quad (1)$$

(3) Feature extractions of palm displacement, velocity, and radius: feature $C=\{C_X, C_Y, C_Z\}$ describes the space movement information of palm[4], $D=\{D_{X_V}, D_{Y_V}, D_{Z_V}\}$ describe the change of palm rate during dynamic gesture. R expresses the change of palm radius.

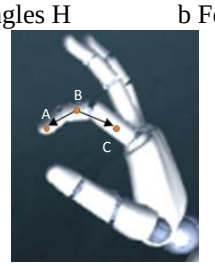
(4) Index fingertip displacement and velocity: $E=\{E_X, E_Y, E_Z\}$ and $F=\{F_{X_V}, F_{Y_V}, F_{Z_V}\}$ indicate displacement information and rate information of index fingertip respectively.

(5) Fingertip-elevations G_i, $i=1,2...5$, are the distances of the fingertips from the plane corresponding to the palm region

(6) Finger-angles H_i, $i=1,2...4$. The 3D coordinate of bone1 and bone2 is shown in figure 4.a. The angle between space vectors $\vec{AB}$ and $\vec{CD}$ can be calculated by Eq.(2-4), whose variation can describe the change of dynamic hand gestures.

a Finger-angles H

b Feature I



c Feature J

Figure 4 Features

$$\vec{AB} = (Ax - Bx, Ay - By, Az - Bz) \quad (2)$$

$$\vec{CD} = (Cx - Dx, Cy - Dy, Cz - Dz) \quad (3)$$

$$\theta = \arccos \frac{\vec{AB} \cdot \vec{CD}}{|\vec{AB}| \cdot |\vec{CD}|} \quad (4)$$

(7) For discussing the influence of different combinations of gestures on gesture recognition rate, angle features of fingers in different dimensions that expressed by I and J are extracted and compared with feature A. For feature I, the position of the node and the bone point is obtained to calculate the angle between vectors. Three angles of index finger are extracted in figure 4.b. In fifteen angles of each frame, $I_{f_{22}}$ indicates the second angle of index finger, other angles can be expressed by I=$\{I_{f_{11}}, I_{f_{12}}, I_{f_{13}}, I_{f_{21}}, I_{f_{22}}, I_{f_{23}}, I_{f_{31}}, I_{f_{32}}, I_{f_{33}}, I_{f_{41}},$

$I_{f_{42}}, I_{f_{43}}, I_{f_{51}}, I_{f_{52}}, I_{f_{53}}\}$. It just needs to obtain the coordinate of the bone points for feature. As shown in figure 4.c, one angle of index finger is utilized, that is, $J = \{J_{f_1}, J_{f_2}, J_{f_3}, J_{f_4}, J_{f_5}\}$.

2.4 Preprocessing of Dynamic Rehabilitation Gesture Data

The high-dimensional observation sequence composed of multiple features will generate a huge amount of computation, and each gesture to achieve the shape and size of the space is different, which cannot meet the requirements of unified modeling. Therefore, the extracted sample feature data must be preprocessed.

Preprocessing 1: Normalizing the extracted data into [0,1], the formula is:

$$X_{norm} = \frac{X - X_{min}}{X_{max} - X_{min}} \quad (5)$$

This method can scale the original data equally, and the X_{norm} indicates the data after normalizing, X indicates the original data, $X_{\max}$ and $X_{\min}$ indicate the maximum and minimum of the feature sequence.

Preprocessing 2: Insert frames to make the time sequence identical. For different frames of samples, the nearest interpolation method is adopted to make all the frames of samples identical, namely 115 frames of data. The final features are dimensionally consistent to meet the requirements of unified modeling.

3. RECOGNITION OF DYNAMIC REHABILITATION GESTURES

3.1BP Neural Network

BP network is proposed by Rumelhart and McClelland et al. in 1986. It is a multi-layer feedforward network trained by error inverse propagation algorithm, which is one of the most widely used neural network models [5]. BP network can learn and store a large number of input-output pattern mapping relationships without revealing the mathematical equations describing the mapping relationships in advance. Its learning rule is to use the gradient descent method to continuously adjust the weights and thresholds of the network through back propagation, so as to minimize the sum of squared errors of the network. The topology of BP neural network model includes input layer, hidden layer and output layer [6-7].

In this section, the processed data set is input into BP neural network, and BP neural network is used to identify different feature combinations. 300 samples are used as the training set while 50 samples for the test set. The accuracy rate of each time is the correct number of identifications divided by the total number of tests, and the accuracy rate of recognition is the average recognition rate of 10 verifications.

Table 1 Different Feature Combinations' Recognition Rate

Number	Feature Combinations	Rate
1	A+B	44.05%
2	A+B+C+E	88.42%
3	A+B+C+E+R	89.57%
4	A+B+C+E+R+G	80.56%
5	A+B+C+E+R+G+H	82.00%
6	A+B+C+E+R+G+H+D+F	70.11%
7	I+B+C+E+R+G+H	75.42%
8	I+B+C+E+R+G+H+D+F	62.71%
9	J+B+C+E+R+G+H	81.90%
10	J+B+C+E+R+G+H+D+F	65.71%

It is clear that different feature combinations have different recognition rates in table 1, among which the number 1 feature recognition rate is just 44.05%. By comparing No.1 and No.2, the recognition rate is greatly improved. It indicates that C and E features, as well as the coordinate features of palm and index finger are effective features, which can well describe the dynamic rehabilitation gesture. Through the comparison between 2 and 3, 3 and 4, 4 and 5, it can be known that the palm radius R and the Finger-angles H are conducive to gesture recognition, while the fingertip height of G is not suitable for the collected data set. Meanwhile, from the comparison between 5 and 6, 7 and 8, 9 and 10, another conclusion can be drawn that palm rate D and index finger fingertip rate F are not applicable to the collected data set. It is also clear that the recognition rates of feature combinations 5, 9 are similar, while recognition rate of feature combinations 7 is low by comparing the No.5, 7 and 9 feature combinations. Which indicates that angle I is unsuitable. In a conclusion, feature B, C, E, R, H is valuable for gesture recognition. In addition, another experiment is performed below for comparing the roles of feature A and J clearly.

Table 2 Comparison of feature A and feature J Recognition Rate

Number	Feature Combinations	Rate
11	A+B+C+E+R+H	90.71%
12	J+B+C+E+R +H	83.69%

As shown in table 2, the comparison of feature combinations numbered 11 and 12 shows that feature A can better identify the collected dynamic data and improve the recognition rate of gesture, so No.11 is the optimal feature combination.

However, BP neural network has obvious disadvantages of slow training and running speed when training and testing high-dimensional data. Therefore, this paper proposes an optimization method based on Tsne-BP model to reduce the feature dimension, so as to significantly improve the training and testing rate, and this method can also improve the recognition rate.

3.2 Tsne Dimension Reduction Visualization Technology

Tsne is an algorithm derived by SNE, and SNE first

appeared in 2002, it changes the thought of ISOMAP and MDS. While mapping the higher dimensions to the lower dimensions, the distribution probability between them should not change as much as possible. SNE regards the sample distribution in both high and low dimensions as the Gaussian distribution [8], while Tsne regards the coordinates in low dimensions as T distribution. The advantage of this is to enlarge the distance between clusters with large distances, thus solving the crowding problem.

Tsne algorithm models the distribution of nearest neighbor of each data point [9], where nearest neighbor refers to the set of data points close to each other. T distribution function and gaussian function have similar effect on the similarity between description point pairs. Yet, in terms of calculation, T distribution function avoids the exponential operation of gaussian function and greatly improves the operation speed. The calculation process is as follows: the original data is $X = \{x_1, x_2, ..., x_n\}$, the Perplexity factor is Perp , iteration number is T，learning rate is η, dimension m , and $\alpha(T)$. The final result is $y^{(T)} = \{y_1, y_2, ..., y_n\}$. In high-dimensional space, the probability distribution of point x_j to point x_i is defined as:

$$P_{j|i} = \frac{\exp(-\| x_i - x_j \|^2 / 2\sigma_i^2)}{\sum_{k \neq i} \exp(-\| x_i - x_k \|^2 / 2\sigma_i^2)} \quad (6)$$

σ is the variance of the Gaussian centered on x_i .

Set $P_{ij} = \frac{P_{j|i} + P_{i|j}}{2n}$, where n is the number of data points. Calculate the low dimensional similarity.

$$q_{ij} = \frac{(1+\| y_i - y_j \|)^{-1}}{\sum_{k \neq 1}(1+\| y_i - y_l \|)^{-1}} \quad (7)$$

Calculate the KL divergence:

$$C = KL(P \| Q) = \sum_i \sum_j P_{ij} \log \frac{P_{ij}}{q_{ij}} \quad (8)$$

Conditional probability between y_i and y_j, there exists a conditional probability distribution Q in low dimensional space, and it should be consistent with P, KL divergence is a measure of similarity between Q and P.

Calculate the gradient to minimize KL divergence:

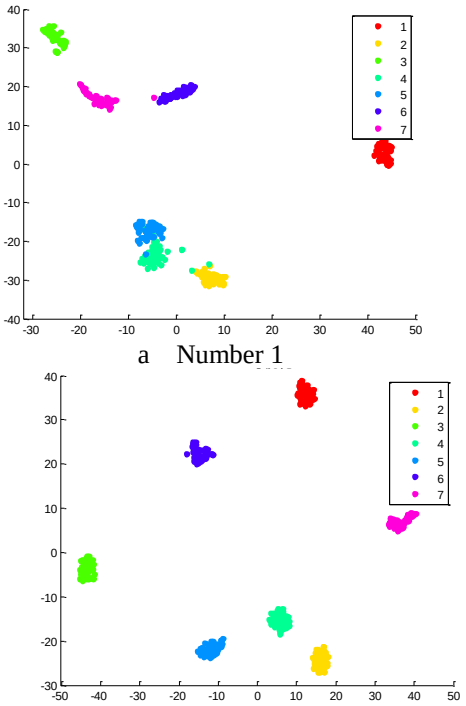
$$\frac{\delta C}{\delta y_i} = 4\sum_j (q_{ij} - P_{ij})(y_i - y_j)(1+\| y_i - y_j \|^2)^{-1} \quad (9)$$

In order to accelerate the optimization process and avoid falling into a poor local minimum, add a momentum term into the gradient. The gradient updating rule is:

$$y^{(t)} = y^{(t-1)} + \eta \frac{\delta C}{\delta y} + \alpha(t)(y^{(t-1)} - y^{(t-2)}) \quad (10)$$

Loop step (2) - step (5), Iteration T time. Finally, low-dimensional data are obtained: $y^{(T)} = \{y_1, y_2, ..., y_n\}$.

The data of seven kinds of gestures are visualized via Tsne dimension reduction technology, whose results are shown in figure 5.



a Number 1

b Number 11

Figure 5 Tsne dimension reduction visualization technology (seven different gestures different colors)

Tsne dimensionality reduction can clearly cluster and distinguish seven kinds of gestures. Therefore, Tsne can be used to reduce the dimensionality of different features in different dimensions. Clustering result of No.1 feature combination is shown in figure 5.a. It can be seen that the clustering results of 5, 4 and 2 gestures are relatively compact, and 7 gestures cannot be well clustered. Meanwhile, the comparison between figure 5.a and figure 5.b shows the influence of different feature combinations on the clustering results. Then, the results of dimension reduction of Tsne are input into BP neural network for training and testing.

Table 3 Different Feature Combinations' Recognition Rate Under Tsne-BP Model

Number	Feature Combinations	Rate
1	A+B	78.04%
2	A+B+C+E	94.86%
3	A+B+C+E+R	95.71%
4	A+B+C+E+R+G	93.68%
5	A+B+C+E+R+G+H	98.14%
6	A+B+C+E+R+G+H+D+F	97.71%
7	I+B+C+E+R+G+H	96.71%
8	I+B+C+E+R+G+H+D+F	96.28%
9	J+B+C+E+R+G+H	98.56%

10	J+B+C+E+R+G+H+D+F	96.42%
11	A+B+C+E+R+H	99.7%
12	J+B+C+E+R +H	98.85%

By comparing table 1, table 2 and table 3, it can be seen that the Tsne-BP model proposed in this paper significantly improves the recognition rate of gestures. the No.11 optimal feature combination even achieves 99.7% recognition rate. LeapMotion gesture recognition is more interactive than the Kinect sensor in literatures [10-12]. Compared with literatures [4][13-14], the proposed scheme not only optimizes the selection of gesture features, but also improves the gesture recognition rate effectively.

4. CONCLUSIONS

In this paper, a dynamic rehabilitation gesture recognition method based on multi-feature combination Tsne-BP model was proposed. In a conclusion, finding the optimal combination of features has a great impact on the recognition of dynamic rehabilitation gestures. Meanwhile, the Tsne-BP model proposed can efficiently identify and classify dynamic rehabilitation gestures, with the highest recognition rate of 99.7%, which has laid a good foundation for the follow-up rehabilitation training and evaluation research.

ACKNOWLEDGEMENT

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REFERENCES

[1]Naranjo J E, Urrutia Urrutia F, Garcia M V, et al. User experience evaluation of an interactive virtual reality-based system for upper limb rehabilitation. ICEDEG, 2019: 328-333.

[2]R G. Lupu, N Botezatu, F Ungureanu, et al. Virtual reality based stroke recovery for upper limbs using leap motion. ICSTCC, 2016: 295-299.

[3]Liu L, Chen X, Lu Z, et al. Development of an EMG-ACC-based upper limb rehabilitation training system. IEEE TRANSACTIONS ON NEURAL SYSTEMS AND REHABILITATION ENGINEERING, 2017, 25(3): 244-253.

[4]Lu W, Tong Z, Chu J. Dynamic hand gesture recognition with leap motion controller. IEEE SIGNAL PROCESSING LETTERS, 2016, 23(9): 1188-1192.

[5]Zhang C, Liu S, He J. The study of surface state identification based on BP-adaboost algorithm. Chinese Control Conf., 2018: 5884-5888.

[6]Liu L, Chen J, Xu L. Realization and application research of BP neural network based on MATLAB. 2008 International Seminar on Future BioMedical Information Engineering, 2008(3): 130-133.

[7]Cao Y, Tian L, Zhao H. The application of BP neural net real-time data forecasting model used in home environment. IEEE-CYBER 2015, 2015: 1486-1490.

[8]Bunte K, Haase S, Biehl M, et al. Stochastic neighbor embedding (SNE) for dimension reduction and visualization using arbitrary divergences. Neurocomputing, 2012(90): 23-45.

[9]Che L, Kong Y. Gait recognition based on DWT and t-SNE. IET Conf. Publ., 2015.

[10]Ren Z, Yuan J, Meng J, et al. Robust part-based hand gesture recognition using kinect sensor. IEEE Trans. Multimed., 2013.

[11]TMurata T, Shin J. Hand gesture and character recognition based on kinect sensor. Int. J. Distrib. Sens. Networks, 2014.

[12]Ding I J, Chang C W. Feature design scheme for Kinect-based DTW human gesture recognition. Multimed. Tools Appl., 2016, 75(16): 9669-9684.

[13]Zhang Q, Deng F. Dynamic Gesture Recognition based on LeapMotion and HMM-CART Model. J. Phys. Conf. Ser. 2017, 910(1): 012037.

[14]Wang Q, Xu Y, Chen Y L, et al. Dynamic hand gesture early recognition based on Hidden Semi-Markov Models. IEEE ROBIO 2014, 2014: 654-658.

Research on Control Strategy of Central Air Conditioning and Refrigeration Station

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Abstract:For the central air-conditioning refrigeration station, this paper introduces and analyzes several refrigeration station control methods in detail, including variable water temperature control method, chilled water variable flow control technology, chiller group control strategy, refrigeration station variable flow and variable water temperature comprehensive energy saving optimization. Control Strategy. Through the analysis of these several control methods, it can be seen that the chilled water flow dynamic control strategy based on load forecasting can make the chilled water system always in the best cold supply state and save the energy consumption of the chilled water pump. The integrated energy-saving optimization control strategy of variable flow and variable water temperature in the freezing station is adopted. The energy consumption of the chiller and the energy consumption of the chilled water pump are considered comprehensively, and the sum of the operating powers of the two is taken as the optimization performance index.
Keywords:Central air conditioning; Refrigeration station;Energy-saving

1. INTRODUCTION

With the popularization of central air-conditioning, the energy consumption of buildings has increased greatly, while the energy consumption of central air-conditioning systems accounts for more than half of the total energy consumption of buildings. The demand for air-conditioning electricity and the proportion of power supply to the grid are increasing. As the core of the central air-conditioning system, the energy consumption of the refrigeration station is the main factor. It is of great practical significance to study the energy-saving optimization operation control strategy of the central air-conditioning system refrigeration station. The central air conditioning system refrigeration station is mainly composed of refrigeration units, cooling water pumps, chilled water pumps and cooling towers. According to the characteristics of the refrigeration station, this paper analyzes the control method of the refrigeration station.

First, we analyze the traditional air conditioning and refrigeration station control methods. In the primary/secondary pump chilled water system, if the load is proportional to the flow rate, the chilled water supply and return water temperature difference is constant, and the system is operated under design conditions. The traditional control method is: the chiller components can be based on the system flow rate. It is put into operation in stages, so that the chillers can be loaded or unloaded one by one according to the flow. When the flow of the secondary circuit begins to increase beyond the primary circuit, a primary pump and a chiller are added; when the flow of the secondary circuit is reduced to more than one chiller, a chiller and a primary pump are turned off. However, due to factors such as coil fouling, thermostat setting errors, and chilled water supply and return water temperature differences, the system rarely operates at the designed temperature difference, and most of the time it runs under partial load. Therefore, it is not reliable to reflect the state of the load by the flow rate. Therefore, in the conventional air conditioning and refrigeration station control method, the assumption of control is usually not established. Controlling the operation of the air-conditioning and refrigeration station through this control method will inevitably result in more chiller units operating in partial load than the actual number of units that need to be put into operation, making the operation efficiency of the refrigeration station low.

For example, a chiller using a hydrocarbon refrigerant can increase the cooling capacity by 0.5% to 1.5% as the temperature of the cooling water at the inlet of the condenser decreases by 1 °C. However, when the chillers are loaded or unloaded one by one according to the flow rate, they cannot realize the benefits of increasing the cooling capacity under the higher energy efficiency than the operating conditions. In a typical primary/secondary pump chilled water system, as long as the flow exceeds the design flow of one chiller, the next chiller must be put into operation even if the operating chiller is under partial load operation.

In order to improve the operation efficiency, measures must be taken to avoid the temperature difference between the chilled water supply and return water, so that the chiller can be properly loaded and unloaded.

Let’s take a look at the variable water temperature control method. Due to meteorological conditions and other factors, the air conditioning system is operating under partial load for most of the time, and the air conditioning load is much smaller than the design load. Therefore, according to the annual variation of the air conditioning load, the operating parameters of the chiller are adjusted during the partial load period, and

the chiller evaporating temperature and the cold water supply temperature are appropriately increased, which can improve the operating efficiency of the unit and reduce the operating energy consumption.

Studies have shown that as the cold water temperature at the outlet of the chiller increases, the cooling capacity of the chiller gradually increases and the COP value increases gradually. The increase in the temperature of the cold water increases the evaporating pressure and the evaporating temperature of the chiller, thereby improving the cooling performance of the main engine, resulting in an increase in the cooling capacity and the COP value. When the air conditioning load changes, the steam inlet can be adjusted by adjusting the inlet guide vane of the centrifugal refrigerator or adjusting the rotation speed to meet the requirements of the cooling capacity. The cold water temperature has a linear relationship with the cooling capacity in stages. The lower the cold water temperature, the larger the cooling capacity. When the cold water flow rate is low, increasing the cold water flow rate can significantly increase the cooling capacity; when the cold water flow rate is large, increasing the cold water flow rate does not significantly increase the cooling capacity. The COP increases by 2% to 4% for every 1 °C increase in chilled water effluent temperature. Therefore, on the basis of meeting the process requirements, the cooling water temperature of the refrigeration unit can be increased as much as possible to achieve energy saving. Therefore, according to meteorological conditions and changes in air conditioning load, a reasonable water supply temperature is determined, and a staged variable water temperature operation is implemented during partial load periods, that is, different outlet temperatures of different refrigeration units are used in different time periods, which can improve the operating efficiency of the refrigeration machine and reduce Run energy consumption to achieve energy-saving operation[1].

At present, the most common central air conditioning chilled water variable flow control technology mainly includes constant pressure difference control and constant temperature difference control. In addition, there are variable water control strategies and dynamic control of chilled water flow based on load prediction.

2. CONSTANT PRESSURE DIFFERENCE CONTROL

The constant differential pressure control refers to adjusting the chilled water flow rate by the constant chilled water supply back pressure difference. The differential pressure sensor of the chilled water is detected by the differential pressure sensor installed on the chilled water system pipeline, the measured differential pressure is compared with the set differential pressure, and then the PID control technology is used to convert the frequency differential according to the deviation between the two. The pump is controlled by frequency conversion to regulate the flow of the chilled water pump.

Since the time lag of the differential pressure response is relatively small, when the load side flow fluctuates frequently, the pressure difference can change rapidly following the change of the flow rate, and the adjustment time is short. However, since there is no direct relationship between the load of the chilled water system and the pressure difference, the change of the air conditioning load cannot be accurately described by the change of the pressure difference; likewise, the change of the pressure difference cannot accurately reflect the change of the load. Therefore, it is impossible to adjust the chilled water flow rate by using the pressure difference as a controlled variable, and it is impossible to ensure that the chilled water flow rate changes accurately with the load change. The pressure difference between the supply and return lines in the chilled water system is caused by its resistance. When the chilled water flow rate does not change significantly, the water flow resistance does not change significantly, and the pressure difference does not change at this time. However, if the chilled water flow rate is constant, the chilled water temperature will change as the air conditioning load changes, but the pressure difference does not change. At this time, the constant differential pressure control loses effective control of the chilled water flow. Therefore, the constant differential pressure control is only applicable to the load change accompanied by a significant change in the chilled water flow, so that there is a pressure differential change.

3.CONSTANT TEMPERATURE DIFFERENCE CONTROL

The constant temperature difference control means that the chilled water flow rate is adjusted by the constant chilled water supply and return water temperature difference. The temperature difference between the chilled water supply and the return water is detected by a temperature sensor installed on the chilled water system pipeline, the measured temperature difference is compared with the set temperature difference, and then the PID control technology is used to perform frequency conversion control on the variable frequency chilled water pump according to the deviation between the two. In order to adjust the flow rate of the chilled water pump.

Since the change of the temperature difference of the chilled water supply and return water can directly reflect the change of the air conditioning load, the chilled water supply and return water temperature difference can be used as the controlled variable, and a better control effect can be obtained. However, since the temperature collection point has a certain distance from the end of the air conditioner, and the air conditioning pipeline is relatively long, the temperature change of the chilled water after a cycle (a certain period of time) can be reflected. Therefore, the

constant temperature difference control also has time lag, and the temperature difference of the chilled water supply and return water detected at the current time substantially reflects the temperature change before a period of time. It is not possible to ensure that the chilled water flow accurately changes with the load as a controlled variable to regulate the chilled water flow. When the air conditioning load is abrupt, due to the time lag of the temperature change, the chilled water flow can not follow the load change in time to produce the corresponding adjustment action, and there is a large control time lag, which affects the timeliness and rapidity of the control[2].

Both of the above control methods use the classic PID control. The PID control needs to be adjusted by the proportional coefficient Kp integration time constant Ti and the differential time constant TD. This tuning process is essentially a compromise between proportional, differential and integral control. During the tuning process, the three parameters interact with each other and it is difficult to receive the expected results. PID control cannot solve the contradiction between stability and accuracy. Increasing the control effect can reduce the deviation and improve the accuracy, but it reduces the stability; on the contrary, if the control effect is limited, the stability can be ensured, but the accuracy of the control effect is reduced.

4.VARIABLE WATER CONTROL STRATEGY

The water-saving energy-saving control is to match the amount of cold carried by the cold water and the heat taken by the cooling water with the changing end load, thereby saving the operating cost of the water-conveying loop pump. As the temperature and humidity and other environmental factors change, the load on the air conditioning system changes, and the amount of water required also changes as the load changes.

Under normal circumstances, most of the chillers operate under low load conditions. If the frequency of the pump does not match the load change, it will cause a serious large flow and small temperature difference. In the energy-saving control of variable water volume, it is necessary to ensure that the water flow temperature is controlled within the allowable range while the equipment is operating at a variable flow in a wide range.

In the case of chilled water pump frequency conversion and cooling water pump fixed frequency, the variable water volume control strategy is adopted to control the flow rate of the chilled water by changing the frequency of the chilled water pump to reduce the energy consumption of the chilled water pump. Since the frequency conversion of the water pump is realized only by the temperature difference control, the pump frequency fluctuates greatly, which affects the stability of the control. Therefore, the temperature valve opening degree can be controlled at the same time as the temperature difference control, and the water pump frequency can be controlled by the water valve opening degree and the end temperature difference of the terminal air conditioning unit, which can greatly ensure the end load cooling demand. Reduce the energy consumption of the chilled water pump to achieve better control and energy saving effects.

5.DYNAMIC CONTROL OF CHILLED WATER FLOW BASED ON LOAD FORECASTING

The load forecasting control refers to controlling the chilled water flow rate based on the prediction of the load of the air conditioning system. Load forecasting control is a kind of advanced control. It detects and processes the data by measuring the water supply temperature, return water temperature, flow rate, temperature difference and outdoor ambient temperature of the chilled water system, and uses advanced load forecasting methods to infer The load of the air conditioning system “future time”, the frequency conversion control of the chilled water pump in advance, the chilled water flow rate is adjusted, so that the cooling capacity provided by the system matches the cooling demand of the load demand, and the deviation is minimized.

5.1. Fuzzy Control Technology of Chilled Water Flow Based on Load Forecasting

When the system is running, the air conditioning load is first predicted by the load forecasting technology, and the parameters such as the water supply temperature, the return water temperature, the flow rate, the temperature difference, the actual cooling capacity of the air conditioning area, the outdoor environmental temperature and the outdoor solar radiation intensity of the chilled water system at the current time are adopted. The air conditioning load at the next moment (ie, the required cooling capacity of the air conditioning area) is predicted and transmitted to the fuzzy controller. The fuzzy controller obtains the controlled air conditioning load deviation and the deviation change rate by comparison, and uses a series of control rules in the fuzzy control rule base to obtain the optimal operating parameters (such as chilled water flow) of the expected cooling capacity through fuzzy reasoning. Fuzzy control value, and clear it, convert it into precise control amount, and control the number of running water and speed of the chilled water pump (controlled object) through the actuator to adjust the chilled water flow to provide the next moment The amount of cooling required for air conditioning equipment[3].

The actual load at the current time is compared with the predicted load, and the predicted load control effect is evaluated according to the deviation between the two, and the load is automatically corrected online according to the comparison and evaluation situation: when the actual load of the air conditioner is greater than the predicted load, the freezing is improved. The speed of the water pump, thereby increasing the flow of chilled water, to increase the supply of cold, to

ensure the demand for cooling capacity at the end of the air conditioner; when the actual load of the air conditioner is less than the predicted load, reduce the speed of the chilled water pump, thereby reducing the flow of chilled water to reduce Small cold supply, reducing excess cold delivery. The load forecasting control technology is combined with the fuzzy control technology to control the chilled water pump. Through repeated repeated detection, repeated comparison and repeated adjustment, the required cooling capacity of the air conditioning load can be adapted to the cooling capacity provided by the chilled water pump. The chilled water system is always in the optimal cold supply state, saving energy consumption of the chilled water pump.

5.2. Chilled Water Flow Neural Network Fuzzy Prediction Optimization Control Technology

As a kind of optimal control algorithm, predictive control is different from the usual discrete optimal control algorithm, instead of adopting a constant global optimization target, but adopting rolling finite time Domain optimization strategy. This means that the optimization process is not done offline, but repeatedly online. This limited optimization goal method can only obtain a global suboptimal solution under ideal conditions. However, its rolling implementation can take into account the uncertainties caused by model mismatch, time-varying and interference, and make up for it in a timely manner. The new optimization is always based on the actual situation, so that the control remains practically optimal. The three characteristics of predictive control, namely predictive model, rolling optimization and feedback correction, are the concrete manifestations of the concepts of model, control and feedback in general cybernetics. The rolling optimization and feedback correction of predictive control are always based on the actual control process, which can effectively overcome the effects of uncertainties such as inaccuracy, nonlinearity and time-varying of the control system.

The neural network, fuzzy control and nonlinear predictive optimization control can be combined, and the neural network fuzzy predictive optimization control method is used to predict and control the chilled water flow. The feedforward neural network is used as the prediction model, and the self-adjusting fuzzy controller is used as the optimization controller. The multi-step prediction method is adopted. The system optimization performance index comprehensively considers the load deviation (that is, the deviation between the actual cooling capacity and the predicted cooling capacity of the air conditioning load). The minimum and the minimum energy consumption of the chilled water pump are two factors.

6.CONCLUSION

The central air conditioning system refrigeration station is mainly composed of refrigeration units, cooling water pumps, chilled water pumps and cooling towers. The air conditioning cooling load changes with the change of external conditions. The full-load operation time of the air-conditioning system only accounts for 15%-20% of the total running time, so that the refrigeration unit is in a low-load operation state most of the time, it is difficult to guarantee. The refrigeration unit operates at high efficiency. The main factors affecting the energy consumption of the air conditioning system are the performance of the chiller itself and the chilled water flow and the temperature difference between the supply and return water. The main factors affecting the energy consumption of the water pump and the fan are the flow of water or air and the water or air during the transportation process. resistance. Therefore, the research on the change law of building air conditioning cooling load, the partial load performance of refrigeration unit, the matching scheme of refrigeration unit and the operation mode optimization of refrigeration station are more and more concerned by researchers.

REFERENCES

[1]Xiao J M. Research on Energy Saving Method of Central Air Conditioning. Agricultural Equipment & Vehicle Engineering, 2005(2): 44-46.

[2]Tang J, Mo S. Variable flow energy-saving technology and implementation method of central air-conditioning system. Modern Machinery, 2006(4): 96-98.

[3]Yang X C, Tian K C,Yu T M,et al.Application of central air conditioning energy-saving control technology. Building Energy Conservation, 2007, 35(201):11-13.

Research on Thermal Comfort of Buildings Based on Artificial Neural Network

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Abstract: In this paper, we uses artificial intelligence method to study building thermal fitness prediction model and thermal fitness low-power control technology, to study the influence of internal and external factors on thermal fitness and the coupling relationship between them. Using the mechanism and coupling relationship of indoor and outdoor factors, an intelligent algorithm for adjusting thermal comfort is designed to achieve human comfort adjustment with low energy consumption.
Keywords: Thermal fitness; Coupling relationship; Intelligent algorithm; Thermal comfort

1. RESEARCH BACKGROUND

1.1 Research Significance

Comfort is closely related to the indoor environmental control system, and energy consumption is another key issue in indoor environmental control. At present, China's building energy consumption is showing an increasing trend year by year. Building energy consumption includes energy consumption in lighting, heating, air conditioning, elevators, household appliances, and office equipment. They account for a larger proportion of total energy consumption. Heating ventilation and air conditioning system (HVAC) The energy consumption accounts for 40%-60% [1-4]. In order to achieve a higher level of comfort, the proper control of HVAC reduces the energy consumption of the indoor environment, and the integration of energy saving and high comfort is of paramount importance.

1.2 Research Status

With the development of computer technology and people's demands for indoor environment comfort, indoor environmental control technology will develop in the direction of comfort, energy saving and intelligence. Many factors in the indoor environment have an impact on human thermal comfort. These factors and thermal comfort have very complicated nonlinear relationships and unmeasurable control parameters [5-6], which leads to indoor thermal comfort cannot be directly measured and calculated, not even Apply thermal comfort directly to the environmental comfort measurement and control system [7-9]. Therefore, how to construct a predictive model for correct evaluation and accurate prediction of thermal comfort is a key issue in the environmental comfort measurement and control system, and it is also the main content of our research.

2. THERMAL COMFORT CONTROL METHOD IN BUILDINGS

2.1 Control Method Based On Pmv Indicator

There are six factors that affect the thermal comfort of the indoor environment, such as air temperature, air flow rate and relative humidity. If a variable changes, it will affect the change in thermal comfort. The PMV indicator is used as a control system to adjust the indoor thermal comfort. It can influence the change of PMV value according to the current environmental changes. The system will control the indoor equipment according to the change value to maintain the thermal comfort of the indoor environment [10]. At the same time, it can also avoid the problem of too cold or overheating of the room. This control system is also based on the control requirements of thermal comfort, while reducing a lot of unnecessary energy consumption.

2.2 Thermal Comfort System Control Method

The environmental thermal comfort system control method directly uses the PMV index as the control basis, and realizes the separate control of each environmental variable through the set PMV index, that is, the PMV index and each environmental variable must be used as the controlled parameters. If the PMV value is outside the comfort interval, the controller will command the actuator to regulate the indoor PMV value. The specific implementation of the thermal comfort control method is shown in Figure 1.

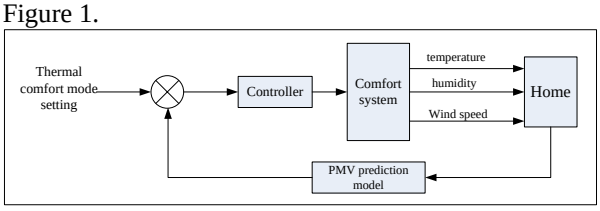

Figure 1 Thermal comfort control mode

3. RESEARCH ON THERMAL COMFORT IN BUILDINGS BASED ON ARTIFICIAL NEURAL NETWORK

The neural network prediction method is an analytical prediction method that is often used at present. The neural network prediction method is a natural nonlinear modeling process. It is not necessary to distinguish the nonlinear relationship between the models. As long as the appropriate training samples and targets are selected, accurate prediction values can be obtained [10-12].

3.1 Research on Thermal Comfort Control Based on

Bp Neural Network

The BP neural network is a non-feedback network with multi-level structure (more than three layers). The outer layer is interconnected and there is no interconnection in the layer. The network has input and output, and the middle layers connect the input and output to transmit signals.

The PMV formula is very complicated and contains high-order, nonlinear iterative calculations. In actual control, it is necessary to continuously calculate according to the measured indoor temperature and humidity. The calculation of the time may cause the air conditioning system to lag and cannot be performed in real time. Regulation. Therefore, the neural network modeling method is chosen to be applied to the modeling of PMV indicators.

3.1.1 Modeling of PMV index based on BP neural network

According to the model topology of BP neural network, a thermal comfort prediction model based on BP neural network is established [13], and its structure is shown in Figure 2.

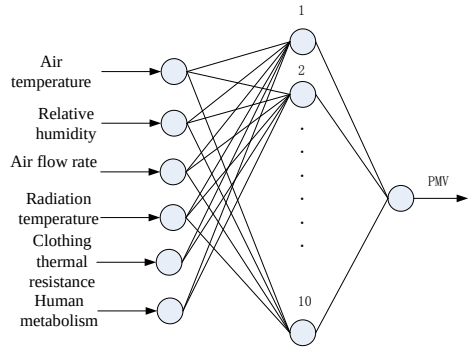

Figure 2 PMV indicator model based on BP network

According to the topology diagram of the BP network, before the network learns the PMV evaluation index, the network structure of the PMV indicator model must be determined, including the determination of the input layer and output layer of the network, the selection of the number of neurons in the hidden layer, and the network. The determination of the initial value.

3.1.2 System simulation and experimental analysis

The system simulation and experimental analysis are based on the Matlab7.0 platform, and the BP neural network training process is generated by using the newff function in the neural network toolbox. The PMV data is derived from the ISO7300 official thermal comfort evaluation standard data set 200. The data samples in this paper are a total of 200 groups, of which 110 groups are used as network training samples and 90 groups are used as test samples. The training results are shown in Figure 3. The 110 training data passes through 601 cycles, and the BP network training is successful. The training time is 19 seconds.

The other 90 sets of verification data are predicted by the trained BP network as shown in Figure 4. The average error is 0.0637, the error value is small, and the prediction accuracy is high.

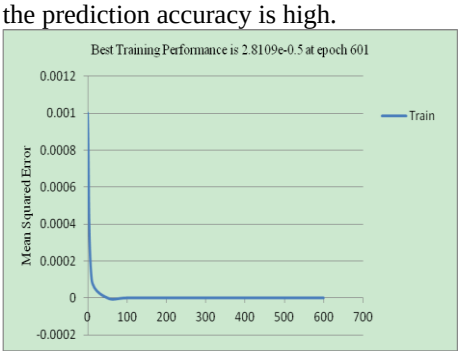

Figure 3 BP network training process

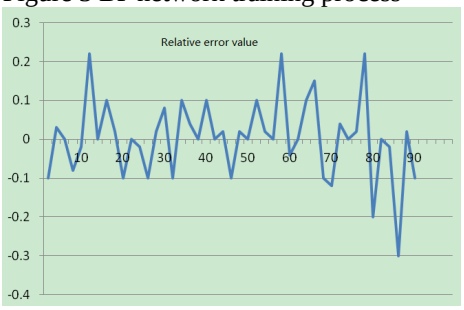

Figure 4 Error between actual value and BP network output value

It can be seen from the above that the thermal comfort prediction model based on BP neural network has higher prediction accuracy in the prediction of thermal comfort feature data, and the whole process is easy to implement, but its network convergence time is longer.

3.2 Research on Thermal Comfort Control Based on ART Neural Network

3.2.1 Adaptive neural network ART algorithm

The adaptive neural network ART algorithm is a competitive learning mechanism based on cognitive and behavioral patterns without online guidance [14-15]. The network has online learning, real-time processing, automatic recognition capability, easy to use hardware extension, and has application to online. Real-time control system and other capabilities. The ATR network consists of two layers, the F1 layer and the F2 layer, with a fully connected structure between the layers.

3.2.2 Modeling of PMV index based on ART neural network

The PMV index model is built based on the ART neural network algorithm. The thermal comfort prediction model is shown in Figure 5.

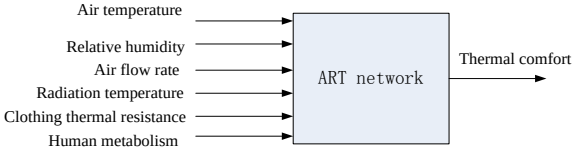

Figure 5 Establishing a PMV indicator model based on ART network

3.2.3 Experimental simulation and analysis

Through the experimental simulation, the network prediction results of the thermal comfort samples are shown in Figure 6. Among them, the blue column

represents the correct prediction data, and the red represents the wrong prediction data.

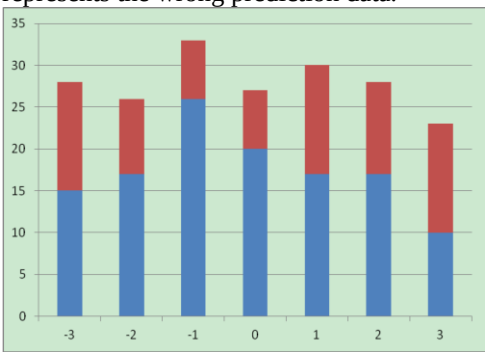

Figure 6 ART thermal comfort prediction classification

3.3 Analysis and Comparison of Two Models

According to the experimental contents of the previous two chapters, the simulation results of different networks applied to comfort modeling can be summarized as shown in Tables 1 and 2:

Table 1 Analysis of BP neural network algorithm results

Algorithm	Sample size	Convergence time	Average error
BP	200	19s	0.0627

Table 2 Analysis of ART Neural Network Algorithm Results

Algorithm	Sample size	Operation hours	Accuracy
ART	200	2.886s	60.8%

In summary, both models have their own advantages and disadvantages. If the real-time requirements are not high and the indoor environment mode is no longer changed, a BP-like network can be used to establish a thermal comfort model with high accuracy. If there are many requirements for real-time requirements, there are many changes in the environment mode, and new knowledge needs to be continuously learned, the ART neural network can be used for thermal comfort modeling, and many signal mechanisms of the network are similar to hardware circuits. Extend with hardware circuits.

4. SUMMARY AND OUTLOOK

In view of the shortcomings of the current home environment measurement and control system, this paper establishes a research on the thermal comfort of smart home based on adaptive method. The main work of this paper is as follows:

(1) Research on the current domestic environmental measurement and control system and thermal comfort related content, and establish a home thermal environment measurement and control system based on human body thermal comfort.

(2) The thermal comfort prediction model of the commonly used BP neural network is established for experimental verification and analysis, and the ART neural network is selected as the prediction method of the thermal comfort model.

(3) The prediction accuracy and network search time of the thermal comfort prediction model are verified by experimental code simulation. And the traditional BP neural network is used to establish a thermal comfort prediction model for comparative analysis and analysis of their respective advantages and disadvantages.

The entire system may have certain limitations in model selection, variable analysis, and control strategies. Therefore, this paper needs to continue to study the relevant models and contents of thermal comfort and the control strategy of thermal comfort in the measurement and control system, and conduct in-depth research on the deficiencies and application problems presented by thermal comfort models, variable analysis and control strategies.

ACKNOLEDGMENTS

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REFERENCES

[1]Liu WW, Lian Z W, Zhao B. A neural network evaluation model for individual thermal comfort. Energy and Buildings, 2007, 39(10): 1115-1122.

[2]Gagge A P, Stolwijk J A J, Nishi Y. An effective temperature scale based on a simple model of human physioloģlcal regulatory response to the thermal environment. ASHRAE Trans, 1971, 77: 247-272.

[3]MatjazPrek. Thermodynamicalanalysisofhumanthermalcomfort. Energy, 2006, 31(5): 732-743.

[4]Henderson H I, Rebgarajian K, Shirly D B. The impact of comfort control on air conditioner energy use in humid climates. ASHRAE Trans, 1992, 98(2): 104-113.

[5]Scheatzle D G. The development of PMV-based control for a residence in a hot and arid climate. ASHRAE Trans, 1991, 97(2): 1002-1019.

[6]Mac Arthur J W. Humidity and predicted-mean-vote based comfort control. ASHRAE Trans, 1986, 92(1B): 5-17.

[7]Kaya A, Chen C S, Raina S, et al. Optimum control polices to minimize energy use in HVAC systems. ASHRAE Trans, 1988, 88(2): 235-248.

[8]Funakoshi S, Matsuo K. PMV-based train air conditioning control system. ASHRAE Trans, 1995, 101(1): 423-430.

[9]Curtis P S. Experimental results from a network assisted PID controller. ASHRAE Trans, 1996, 102(11): 1157-1168.

[10]Yang K H, Su C H. An approach to building energy savings using the PMV index. Building and Environment, 1997, 32(1): 25-30.

[11]Hamdi G, Lachiver M. A fuzzy control system based on the human sensation of thermal comfort. USA: Proceedings of the IEEE International Conference on Fuzzy System, 1998: 487-492.
[12]Xia J, Yu H, Jin X, et al. A PMV-based controller for VAV applications. ACHRB, 2000.
[13]Goto T, Berglund L G.. Fan air speed controls assisted by human response simulation for comfort in warm environment. ISHVAC99, 1999.
[14]Kakegawa M, Berglund L G. An automatic window opening system for comfort control assisted by human response simulation. ISHVAC99, 1999.
[15]Tse W L, Albert T P. Implementation of comfort-based air-handling unit control algorithms. ASHRAE Trans, 2000, 106(1): 29-43.

Research on the messaging systemsof Android

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Abstract:When it comes to the message mechanism in Android, everyone should be familiar with it. We inevitably have to deal with it in development. From the perspective of our development, Handler is the upper interface of the Android message mechanism. We only need to interact with the Handler in our usual development. Through the Handler we can switch a task to the thread where the Handler is located. Everyday we use Handler scenes may be time-consuming operations in the child thread, such as network request data, we may update the UI control after getting the data, because Android rules can only perform UI operations in the main thread, this time We usually create a Handler in the main thread, then send a message to the main thread by using a Handler in the child thread.
Keywords:Messaging systems;Android;Handler;Looper

1. INTRODUCTION

We need to study the Android message system and the concepts of Looper, Handler, mssage, View, etc., or need to start from the basic principle of the message system and its construction. From this source, we can clearly understand the intent of the Android designer to design the message system and the technical route of its design. In the Android system, the inter-thread communication scheme adopts the method of message notification, and the Android application architecture is based on messages and is widely used. The application main thread and other threads, the message implementation principle is the same.

2. BASIC PRINCIPLES OF THE MESSAGE SYSTEM

From the general system design, the establishment of a message loop system requires the following elements: message queue, send message, message read, message distribution, message loop thread. First, let's study the basic model of message-driven[1]. I use the following graphics to represent the most basic structure of a message system.

Figure 1 represents the message queue and message loop that Looper is responsible for managing threads in the Android system. For details, please refer to the source code of Looper. The Looper object of the current thread can be obtained through Loop.myLooper(), and the Looper object of the main thread of the current process can be obtained through Loop.getMainLooper().

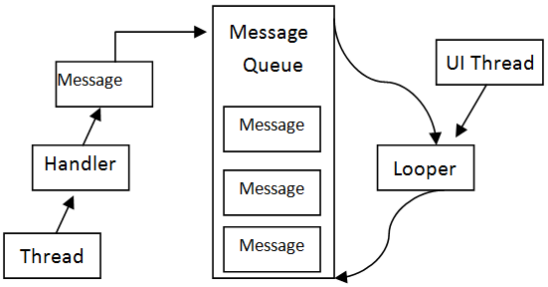

Figure 1How the message works and structure

As mentioned earlier, the message queue and message loop of the Android system are specific to the thread. A thread can exist (of course, it can not exist) a message queue and a message loop (Looper). The message of a specific thread can only be distributed to the thread. Can not cross-thread, cross-process communication. However, the created worker thread has no message loop and message queue by default. If you want the thread to have message queue and message loop, you need to first call Looper.prepare() in the thread to create the message queue, then call Looper.loop(). Enter the message loop.

Activity is a UI thread, running in the main thread, the Android system will create a message queue and message loop (Looper) for the Activity at startup.

The role of the Handler is to add messages to a specific (Looper) message queue and distribute and process the messages in the message queue. You can specify a Looper object when constructing a Handler. If you don't specify it, use the Looper of the current thread to create it[2-3].

3.ANDROID MESSAGE MODEL

Android wants to establish a message system using the concepts of Looper, MessageQueue, Handler, etc. The essential thing is the design of the message distribution path and message distribution processing method in the message queue. Android cleverly uses object abstraction technology to abstract the concept of Looper and Handler. Based on the two concepts of Looper and Handler, through the processing function framework of View, Android achieves the purpose of message distribution perfectly.The Android message system framework is shown in Figure 2.

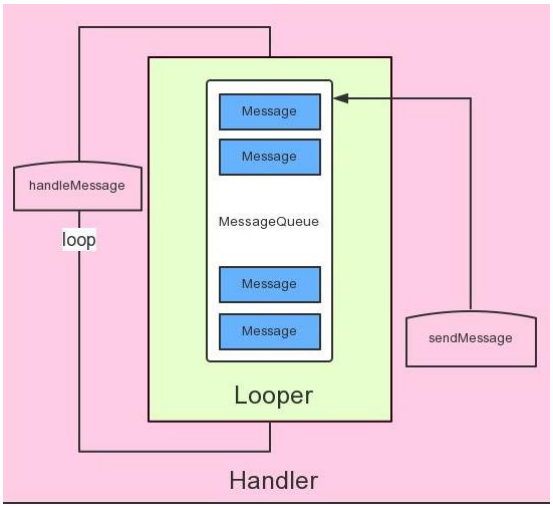

Figure 2Android message system framework

4.LOOPER AND HANDLER

In Android system, Looper is responsible for managing message queues and message loops of threads. Loop. myLooper () can get the Loper object of the current thread. Loop. getMainLooper () can get the Loper object of the main thread of the current process. Looper only generates a message looping framework. Handler object obtains message queue in the same thread context and encapsulates message queue. The most important thing is that SendMessage acts as dispatchMessage. As shown in Figure 3,the external system needs to send a message to an Android thread, which must be done through an object that belongs to the Android Thread.

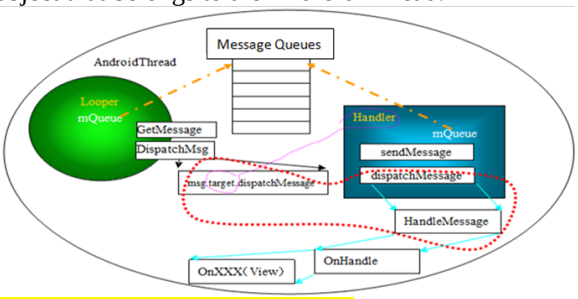

Figure3 Message Queue Diagram

Android applications are also message-driven and, in principle, should provide a message looping mechanism[5-7]. In fact, Google refers to Windows's message loop mechanism and implements it in Android system.

Android implements message looping mechanism through Looper and Handler. Android message looping is for threads (each thread can have its own message queue and message loop). Looper literally means "looper" and is designed to turn a normal thread into a Looper thread. Looper threads are threads that work circularly. In program development (especially in GUI development), we often need a thread to loop continuously. Once there is a new task, it will execute and wait for the next task. This is Looper thread.

Handler plays the role of adding and processing messages to MQ (only processing messages sent by itself), that is, a task to be performed through MQ (sendMessage), and the whole process is synchronous when loop comes to itself[4]. Handler is associated with a looper when it is created, and the default constructor will associate the looper of the current thread.

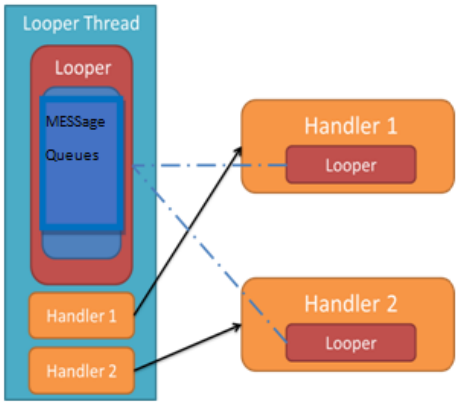

Figure 4 Handler rendering

From the above and Figure 4, we can conclude that a thread can have more than one handler, but only one Looper.

Android's main thread is also a looper thread (looper is widely used in Android), and the handler we created in it will be associated with the main thread MQ by default[8]. Therefore, using a solution of handler is to create handler in activity and pass its reference to worker thread. After the worker thread completes its task, it sends a message to activity to update the UI using handler.

In the whole message processing mechanism, message is also called task, encapsulating the information carried by the task and handler handling the task. The usage of message is relatively simple, so we don't summarize it here. But there are several points to be noted:

1) Although Message has the default construction method of public, you should get empty message objects from the cancellation pool through Message. obtain () to save resources.

2) If your message only needs to carry simple int information, use Message. arg1 and Message. arg2 first to deliver information, which saves more memory than using Bundle.

3) Make use of message. what to identify information in order to process messages in different ways.

Handler sends a message to MessageQueue in the sub-thread, and after the message is taken out by Looper, handleMessage method is distributed to handler for processing[9-11].

So why does a Looper correspond to multiple handlers? How does Looper ensure which handler sends out messages that will be handled by which handler?

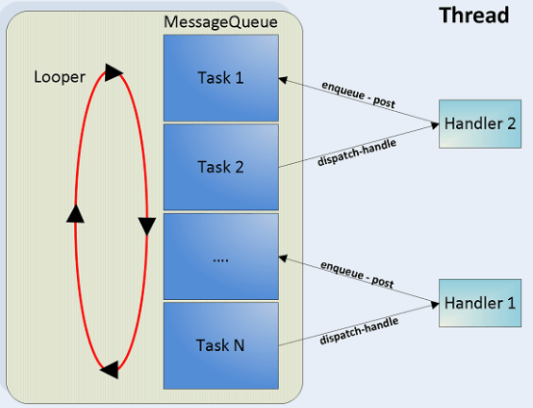

Figure 5 Association between Looper and Handler

As shown in Figure 5,Because when Handler sends a message, the current handler reference is marked on the Message member variable target:

Message. target = this;

When Looper fetches the message, it distributes the message in the following way:

Message. target. dispatchMessage (message);

Therefore, which handler sends the Message, which handler will process the Message[12].

5.CONCLUSION

HandlerThread is an instance created explicitly through new, and the Looper bound to it is instantiated during the execution of HandlerThread, and the corresponding MessageQueue is instantiated in the process.Then I have come to the conclusion that looper. loop is actually a while (true) dead cycle, MessageQueue is a reference retained by Looper, and the next message to be processed in MessageQueue is obtained through its next () [sequence 1]. If there is no corresponding message in the process, the thread executing it will use this wait. () Release the object lock of the MessageQueue it owns and wait.

REFERENCES

[1]Liu Weiguo, Yao Wei. Research on android architecture and application development. Central South University: School of Information Science and Engineering Computer System Application, 2008(1):110-112.

[2]Enck W,OngtangM,McDanielP. Understanding android security. Security&Priva,IEEE,2009.

[10]Yang Feng. The secret of android application development. Mechanical Industry Press, 2010.

[3]Xi Yan, Yao Shanglang. Getting started and practice of android. People's Post and Telecommunications Publishing, 2009.

[4]Sandeep Kumar. Location based services using android. Internet Multimedia Servis ArchitectureandApplications,2009.

[5]Liu Changping, Fan Mingxi, Lightweight access control for android phones. People's Posts and Telecommunications Press, 2010.

[6]Yang Feng.The secret of Android application development. Beijing Mechanical Industry Press, 2010.

[7]Yu Zhilong, Chen Yuxun, Zheng Mingjie. Android SDK development example Daquan. Beijing People's Posts and Telecommunications Press, 2010.

[8]Shane Conde. Android wireless application development. AddisonWesley,2010.

[9]Xiong Gang.Design and implementation of smartphone based on android. Wuhan University of Technology, 2010.

[11]Chen Wei, Zhang Xiaolei, Hou Yanping, et al. Java software development technology. Beijing: People's Posts and Telecommunications Press, 2005.

[12]GongLei,ZhouCong. Development and research of mobile termination application basen android.Computer And Modernization,2008.

The Management of Android's Graphics Window

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Abstract:The full name of GWES is Graphics Windowing and Event Subsystem. Using GWES to represent Android's window event system is not so accurate, because windows is a weakened concept in Android, and it's more expressed in the concept of View. To a large extent, Android's View concept can replace Microsoft Windows, and it's more precise.
Keywords:GWES;DecorView;View Management;WindowManager

1. INTRODUCTION

GUI(Graphical User Interface) refers to the user interface of portable devices such as computers or mobile phones displayed graphically. First, we start with Android's SDK External Feature Space. When we write Active, we are all dealing with functions. How does the system deal with this process? We need to understand Andoid's View Management, Window System, Message System and Input System first[1]. Android is an embedded graphical user interface system. Its basic principle is the same as that of general GUI, and it also follows the general rule of GWES. Overall, Android is a system that manages user input and system screen output. In fact, the name GWES can better reflect the basic essential elements of GUI: graphics, windows, events.

What we want to focus on is the management of graphics and windows.

Android's window management is in C/S mode. The DecorView in Android is the Top-Level View of the window, which we call the Main View. DecorView is automatically added to the Main Window of Activity by default. The main view is added to the Windows Manager, and the system uses Windows State to correspond to the main view.

After Activity establishes a main window, when adding the main window to Windows Manager, it first establishes a Windows Manager proxy object, opens a session (implements the IWindows Session AIDL interface), and maintains the session. Activity will connect with Windows Manager through this session, which is the foundation of C/S system[2-4]. Client will add windows to Windows Manager through Windows Session. A complete window concept spans View,ViewRoot,WindowManager Service. The relationship is shown in Figure 1.

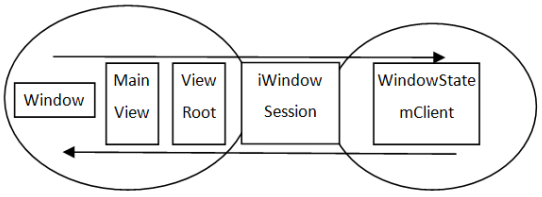

Figure 1 The relationship of Activity and WindowManager

Activeness of the client establishes a session with Windows Manager through Session session, while Windows Manager accesses the client through the IWindow interface and passes the message to the client. Windows is not a very important concept in Android. Android's Windows class is only used in Phone Windows and Mid Windows[5].

2. VIEW

The really important concept in Activity is View. In Android, View has a broader extension than View, which includes user interaction and display. View only represents static display in Chinese. The understanding of View should begin with the easiest understanding. The function of window in Android is realized through View. This View needs to display text, receive keyboard input and mouse click events of users, multiple editors on a screen, how to manage and how to switch focus View, all of which need appropriate management methods.

Let's start with an example of Phone Windows View.The View Structure of Phone Windows is shown in Figure 2.

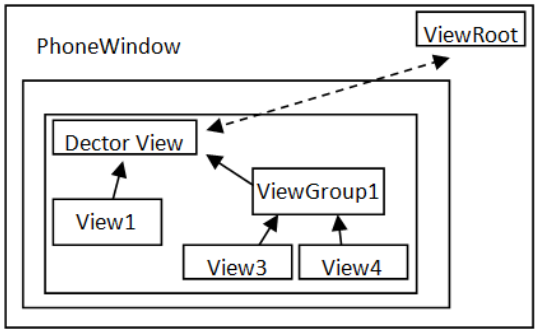

Figure 2 View Structure of Phone Windows

Applying Activity. Attach() in PerfmLaunchActivity to build a PhoneWindow main window. The establishment of this main window is not a key point. To start an activity, adding the main window to the Windows Manager is not actually adding the main

window itself, but adding the DecorView of the main window to the Windows Manager. DecorView is the top view of the entire Windows interface[6].

3. DRAWING PROCESS OF VIEW

Android's UI interface is composed of View and ViewGroup and their derived classes. View is the base class for all UI components, and ViewGroup is the container for these components, which is derived from View itself. Before drawing View, first look at the structure of the View tree,shown in Figure 3.

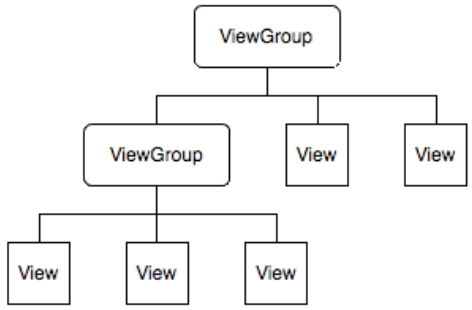

Figure 3 Structure of View Tree

ViewGroups as containers can contain both views as leaf nodes and sub-ViewGroups at a lower level, while sub-ViewGroups can contain views and ViewGroups of the next leaf node. Through this flexible view hierarchy, a very complex UI layout can be constructed, which enables developers to design and develop powerful and flexible UI interfaces[7-8].

The rendering process of View is expanded by the performTraversals () function of the ViewRoot. Java class. The execution process of this function can be simply summarized as judging whether the view size needs to be recalculated according to the state set before.

4. THE RENDERING OF VIEW-TO-WINDOW

View needs a series of actions to collaborate from building to rendering in the hardware display interface. These actions need to be implemented by mobilizing a series of classes in Java and JNI layers. Let's first look at some of the key classes in detail.

4.1 Class of windows

This class is an abstract class that provides a set of general APIs for drawing windows. It can be understood as a carrier in which various views are displayed[9]. The main source files are as Figure 4.

```
1.  public abstract class Window {
2.      //...
3.      // Activity
4.      public static final int FEATURE_NO_TITLE = 1;
5.      public static final int FEATURE_INDETERMINATE_PROGRESS = 5;
6.      public abstract void setContentView(int layoutResID);
7.      public abstract void setContentView(View view);
8.      public boolean requestFeature(int featureId) {
9.          final int flag = 1<<featureId;
10.         mFeatures |= flag;
11.         mLocalFeatures |= mContainer != null ? (flag&~mContainer.mFea
tures) : flag;
12.     return (mFeatures&flag) != 0;
13.     }
```

Figure 4the main source code of windows class

4.2 Class of PhoneWindow

This class inherits from the Windows class and is the concrete implementation of the Windows class. That is to say, we can draw windows through this class. The class contains a DecorView object, which is the root view of all application windows (Activity interfaces). In short, the PhoneWindow class wraps a FrameLayout class, the DecorView object, as the root view of the application window, and provides a set of general window operation interfaces.

4.3 Class of DecorView

This class is a subclass of FrameLayout and a subclass of Phone Window, which is an extension of the functionality of ordinary FrameLayout, or more precisely, a decorator, such as adding TitleBar and scrolling bar on TitleBar. Most importantly, it is the root view of all application windows.The code is shown in Figure 5.

```
1.  private final class DecorView extends FrameLayout {
2.      //...
3.      @Override
4.      public boolean onTouchEvent(MotionEvent event) {
5.          return onInterceptTouchEvent(event);
6.      }
7.      //...
8.  }
```

Figure 5The source code of DecorView class

When the system is configured to start an activity, the onCreate () method of the activity is called back. In this method, we set the display interface of the activity by setting the setContentView () method class, and the whole call expands accordingly[10-11]. In an application, setContentView () can be called many times to display the program's interface.

5.VIEWROOT AND WINDOW MANAGER SERVICE

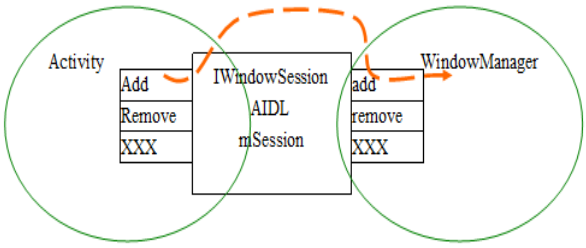

Figure 6Function of viewroot

An shown in Figure 6,ViewRoot is actually a handler. ViewRoot builds a bridge between the main View and Windows Manger. ViewRoot is essentially a handler. Handler's basic function is to process callbacks and send messages.

What kind of management framework does this process establish on the client side and how does this session work? Constructing a ViewRoot and opens a session and establishes the session context using Windows Session[12-13].The relation of ViewRoot and Window Manager is shown in Figure 7.

This research on WindowsManager Service is limited to Focus Windows messaging system. The window managed by Windows Manager is the Top-level window of the application. We refer to the concept of Windows here as the main window. The main window is managed together to compute the Z-order sequence and hide the application window according to the state of the application.

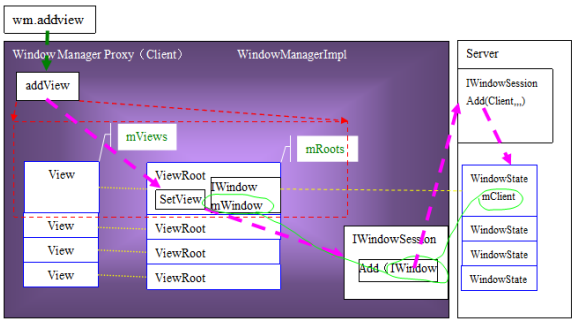

Figure 7The relation of ViewRoot and Window Manager

REFERENCES

[1]GongLei,Zhou Cong. Development and research of mobile termination application basen android.Computer and Modernization, 2008.

[2]Xiong Gang.Design and implementation of smartphone based on android. Wuhan University of Technology, 2010.

[3]Xi Yan, Yao Shanglang. Getting started and practice of android. People's Post and Telecommunications Publishing, 2009.

[4]Sandeep Kumar,Location. Based services using android. Internet Multimedia Servis ArchitectureandApplications,2009.

[5]Liu Changping, Fan Mingxi. Lightweight access control for android phones. People's Posts and Telecommunications Press, 2010.

[6]Yang Feng.The secret of android application development. Beijing Mechanical Industry Press, 2010.

[7]Yu Zhilong, Chen Yuxun, Zheng Mingjie. Android SDK development example Daquan. Beijing People's Posts and Telecommunications Press, 2010.

[8]Shane Conde. Android wireless application development. AddisonWesley,2010.

[9]Enck W,OngtangM,McDanielP. Understanding android security. Security&Priva,IEEE,2009.

[10]Yang Feng. The Secret of android application development. Mechanical Industry Press, 2010.

[11]Chen Wei, Zhang Xiaolei, Hou Yanping, et al. Java software development technology. Beijing: People's Posts and Telecommunications Press, 2005.

[12]Liu Weiguo, Yao Wei. Research on android architecture and application development. Central South University: School of Information Science and Engineering Computer System Application, 2008(11):110-112.

[13]Liu Ping. A data interaction method for android mobile access server. Xi'an Institute of Finance and Economics Network and Education Technology Center, 2010(9):96-102.

Design and Implementation of U Disk Encryption Based on Des Encryption System

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Abstract: With the popularity of U disk, use the U disk storage information security has become an important problem people fear, because we not enough attention question the safety of the U disk, then increase the U disk to store data security hidden danger, U disk encryption on U disk has a lot to the prevention of security threats.This article first analyzes the USB hardware encryption and usb software encryption technology then, in this article give a U disk encryption system demand analysis design, the key technology of using this system are analyzed.Finally, the U disk encryption system designed in this paper the functions to test analysis.The U disk encryption system to protect the design and implementation of U disk to store data has a certain practical value.
Keywords: U disk, Encryption, DES encryption algorithm

1. INTRODUCTION

As a mobile storage device, U disk because[1] of its small size, easy to carry, cheap and more and more people recognized and used, gradually become the life of mobile phones as indispensable mobile storage devices. Although U disk easy to carry, but also very easy to lose. Ordinary U disk do not have encrypted and data protection, once the U disk is lost or U disk information is stolen, then this will cause a lot of unnecessary trouble to the owner of the U disk. In addition, it is easy to infect the virus or trojans in the use of u disk, and it can also likely to cause the leakage of confidential information[2]. Therefore, the implementation of encryption or protection of the files in the U disk has become a necessary requirement for U disk users. Encryption is the easiest and most effective way to protect the privacy of USB, and scholars at home and abroad have carried out in-depth researches and put forward a series of results[3].This paper presents the design and implementation of DES-based U disk encryption system. The test results show that the system has achieved the system design goal and has good performance and security [4].

2.SAFETY TECHNOLOGY ANALYSIS OF U DISK

U disk encryption technology is divided into two ways: hardware encryption and software encryption[5]. Hardware encryption technology is mainly used to put a dedicatedencryption chip inside the U disk to realize the encryption of U disk at the hardware level[6]. Software encryption is used to encrypt the usb flash drive by placing a specific, cryptographic software on the U disk.

(1) Hardware encryption technology of U disk: it is generally used to encrypt the U disk using hardware data encryption technology. The principle of U disk hardware encryption technology is to solidify the encryption technology into the control chip of the U disk[7]. The encryption process will not leave any trace of encryption on the computer. Hardware encryption U-disk support very large capacity of the Flash, read and write encrypted data is very fast, its efficiency and security is relatively high, and support PKI applications such as digital signature[8], and high compatibility and high rate of encryption.

(2) U disk encryption software technology: software encryption technology refers to the method of using the internal ID of the binding U disk in the software to realize the encryption method of U disk software. U disk encryption software is generally placed in advance of the U disk, the use of encryption before the need to install the program in the U disk, and then realize the U disk software encryption function. This encryption method is relatively simple and the cost is very low , the encrypted U disk can be used on any one computer, compatibility is very strong, typically have a U disk super 3000, superior U disk encryption software[9], etc.

3.DESIGN OF THE DES BASED U DISK ENCRYPTION SYSTEM

3.1 System Process Design

Users on a computer the U disk encryption system, insert the U disk, the system will automatically identify the letter of the U disk, and automatically create a hidden USB folder, users open the program interface, users first select the storage needs to be encrypted file U disk, and then select the text file encryption or for USB folder encryption. Then the user selects the files that need to be stored in the U disk to be imported into the U flash disk, and the user has implemented the hidden encryption function of the USB after importing the files into the USB folder in the U disk. The process is shown in figure 1.

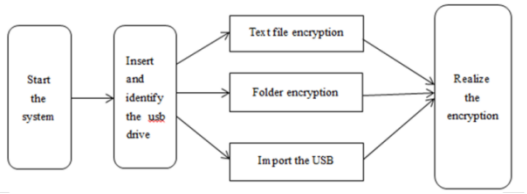

Figure 1System flow diagram

3.2 System Function Design

Based on DES encryption U disk encryption system is mainly monitoring U disk plug, list U disk file, file import and export, text file encryption, folder encryption and decryption and other functions.System function designis shown in figure 2.

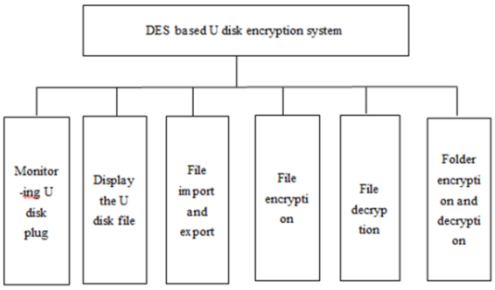

Figure 2 System functional design drawing

Monitoring U disk plug: monitor the U disk flash drive on the main engine, and display the disk of the inserted U disk flash disk in the program.

Display the U disk file: all files in the USB hidden folder are displayed in the program.

File import and export: select file to import USB to import the selected files into the U disk; Click the export file button to export the files in the USB folder to the host.

File encryption: select the file and enter the password click on the encryption button to achieve the file encryption.

File decryption: select the file to be decrypted and enter the correct password Click the decryption button to achieve the decryption of encrypted files.

Folder encryption and decryption: enter the password click the function button to select the USB folder encryption or decryption.

3.3 System Interface Design

The implementation of the system interface needs to use the 7 button control, 2 listBox and 3 textBox. System interface is divided into left and right three parts (shown in Figure 3), the left side of the interface needs to achieve the function is to monitor the U disk to insert the situation and insert the U disk letter displayed in the interface, and then insert the U diskAutomatically create a hidden folder named usb, and then display all the files in the folder; the part can also import or export the file; The function of the middle part is to select the file and type the relevant password to realize the encryption and decryption function of the file. The right part is the password to write to the folder and implement the encryption and decryption function of this folder.

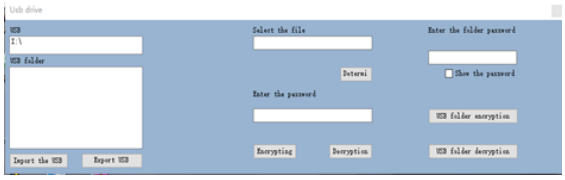

Figure 3 System interface

4.DES-BASED U DISK ENCRYPTION TO ACHIEVE THE KEY TECHNOLOGY

U disk encryption based on DES encryption system, using C# programming language development, development tools for Visual Studio 2012, the main key technologies used are U disk plug monitoring technology, folder encryption and decryption technology, text file encryption and decryption technology,etc.

4.1 U Disk Plug Monitoring Technology

This article uses the CUSBMonitor class to monitor the U disk pull on the host. The CUSBMonitor class implements files that scan the U disk tray and USB folder. If you do not insert the U disk, using U disk encryption system is prompted “please select U disk”;After inserting the USB flash drive, you will display the disk of the inserted USB flash drive in the ListBoxUSB, select the USB flash drive, and then click the “import file” button to select the import into the USB folder.USB folder is running in the program after the U disk automatically create a hidden folder, the folder is hidden in the U disk, USB is not visible to the user, only in the host and run the program is in can see the encrypted content in this program.

4.2 Folder Encryption

Folder encryption use DirectoryEncrypt to encrypt and decrypt all the files in the folder and the subfolders in that folder. When users encrypt the folder, you must first enter your own password and then click “USB folder encryption” button to select the folder and folder encryption, click “USB folder” when need to decrypt, decrypted folder and file folders can be normal use.

4.3 Text File Encryption

The EDncrypt class constructor is used to encrypt the text file, and the EDncrypt class defines methods for encrypting and decrypting file[10]. Its constructors are used to initialize global variables. To encrypt the file, you need to run the encryption thread. You need to use the myEThread method in the encryption thread. This method is a method that the type of the custom is used according to the user Settings file is encrypted password to choose.

4.4 Implementation of Des Encryption Algorithm

The DES algorithm is one of the most widely used key systems. DES uses a 56-bit secret key and an additional 8-bit parity bits, forming the largest grouping size of 64bits. DES class implementations must needs derived from the base class for data encryption standard (DES) algorithm, the use of its CreateEncryptor method to achieve the function of U disk encryption system encryption, CreateDecryptr method is used to implement the decryption

function[11].

The CreateEncryptor method using the specified Key property and the initialization vector (IV) create symmetric encryption device object, The CreateDecryptr method is using the specified Key attributes and initialization vector (IV) create symmetric decryption object.. CreateStream class definition to connect the data stream to the encrypted conversion stream, write data to the encrypted or decrypted stream is used CryptoStream class Write method, The write method is a byte sequence written to the current CryptorStream, promote flow in the current position and the number of bytes written.

5. THE SYSTEM TEST

5.1 U Disk Plug Monitoring Test

Using the U disk encryption system can be achieved into the USB folder, you can also achieve the USB folder file export. "export file" can be achieved in the USB file and can be used in the normal use of the host. The test can successfully implement the import of USB and export files in this system.

5.2 Folder Encryption Test

After USB folder encryption is shown as a lock file,as shown in figure 4 encrypted folder, the use of this U disk encryption system encrypted folder only after the U disk encryption system to decrypt the system can normally open the file Folder and use the files in the folder.

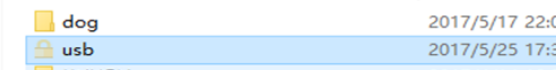

Figure 4 USB folder encryption

5.3 The Performance Comparison

In order to compare the test software: U disk super encryption, easy to U disk encryption software, this paper designed based on DES encryption U disk encryption system. Test environment: Windows10 operating system, Visual Studio 2012. Test results show that in the file for the 1M three software encryption the same files in the same time, the encryption 50M file encryption system proposed in this paper and the other two software time-consuming, the encryption 100M file encryption system proposed in this paper takes the shortest followed by U disk super encryption, optimal longest U disk encryption software, the encryption 200M file encryption system proposed in this paper than U disk encryption software and optimal easily U disk encryption software less time-consuming; As shown in figure 5. (The vertical axis indicates the time used to encrypt the file, the unit is seconds, and the horizontal axis represents the size of the encrypted file).

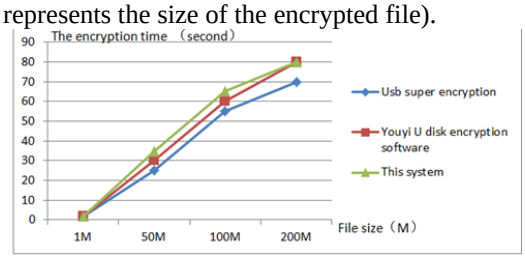

Figure 5 Encryption time and time comparison of usb encryption software

6.CONCLUSIONS

This article designed U disk encryption system, can be stored in the U disk data to achieve a simple encryption operation, in order to protect the privacy of U disk content. When the U disk is lost,the original user of the U disk do not have to worry about their privacy was easily steaenl. In the future development, U disk storage data security will be more concerned about the world, there is no absolute security, U disk encryption crack software there are many, U disk users to strengthen their own security awareness, with the use of some Encryption method to increase the security of their stored information. Hope that this U disk encryption system designed in this paper for U disk users of the general user to bring a little use.

ACKNOWLEDGMENT

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REFERENCES

[1]Zheng S. The DES encryption algorithm in cryptography. Science and technology information, 2011(26):12-12.

[2]Xu J, Wang H. Research and implementation of DES encryption algorithm based on chaotic system [J]. Journal of liaoning university of technology (natural science), 2012(4):273-276.

[3]Shi S, Qi S. Based on vc ++ based DES encryption algorithm. Automation technology and application, 2014, 33(12):25-27.

[4]Casey E, Stellatos G J. The impact of full disk encryption on digital forensics. Digital Investigation, 2012, 8(2):129-134.

[5]Ahmed S, Samsudin K, Ramli A R, et al. Advanced Encryption Standard–XTS implementation in field programmable gate array hardware. Security & Communication Networks, 2015, 8(3)516-522.

[6]Muller T, Freiling F C. A Systematic Assessment of the Security of Full Disk Encryption. IEEE Transactions on Dependable & Secure Computing, 2015, 12(5):491-503.

[7]Chakraborty D, López C M, Sarkar P. Disk encryption: do we need to preserve length?. Journal of Cryptographic Engineering, 2017, 8(4):1-21.

[8]Johannes Götzfried. Mutual authentication and trust bootstrapping towards secure disk encryption. Acm Transactions on Information & System Security, 2014, 17(2):1-23.

[9]Keller F, Kempf W. Latent trait und latent class analysendes beck-depressionsinventars. Chemical Society Reviews, 2006, 35(3):209-217.

[10]Beachem B R. Remote management of endpoint

computing device with full disk encryption. Journal of Bioenergetics & Biomembranes,2015, 47(3):243-254.
[11]Jang S M, Park J H, Pak C U, et al. The Research for Digital Evidence Acquisition Procedure within a Full Disk Encryption Environment. Journal of the Korea Institute of Information Security & Cryptology, 2015, 25(1):39-48.

An Image Recognition Method Using Gray-Gradient Co-Occurrence Matrix Algorithm and BP Neural Network

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Abstract: Aiming at the problem of low monitoring and digitization of desertification grassland in Inner Mongolia, the feature extraction and image recognition of three typical forages were realized, which provided a basis for multi-grass species identification and grassland management. Image processing technology was used to preprocess the image of Phloemic ambrosia, Lemus chiesas and Goose down, and four kinds of invariant rotations representing texture features were extracted for texture feature description. The gray-gradient co-occurrence matrix algorithm was used to realize three. The image recognition of pasture was 93.9%. The experimental results show that the recognition method based on gray-gradient co-occurrence matrix algorithm can effectively realize the image classification of typical pasture.

Keywords: Image recognition; Gray-gradient co-occurrence matrix algorithm; Grass industry digitization; Texture feature extraction; Image preprocessing; Image cquisition; BP neural network

1. INTRODUCTION

Deep learning of pasture is an important way to protect and rationally use grassland resources and ecological environment to achieve national sustainable development strategy. At present, the identification and assessment of grassland resources is mainly through the field observation of grassland workers. This is not only work-intensive, time-consuming and labor-intensive, but also the observation results are subjective and one-sided. Therefore, the digitization and Informa ionization of grassland resources is the current development trend. With the development of computer technology, machine vision technology has begun to be applied to the identification of pasture, but due to the variety of grassland pastures, the overlapping of leaves and the complexity of image processing, the researchers mainly collect images of pasture single leaves and Analyze processing identification.

For example, the literature [1] uses the shape features to extract the characteristics of leguminous grasses and grasses, and uses the principal component analysis method to complete the pasture identification research. Literature [2] planted different proportions of ryegrass and blunt folic acid weeds at the test base of the University of Bonn, Germany, and realized the identification of weeds by machine vision. Literature [3] photographed weed pictures under the influence of different backgrounds, and used color features to distinguish between living weeds and backgrounds. Literature [4] proposes a zero-threshold method that can use a fixed threshold to separate green plants from different backgrounds. In Literature [5], seven shape features such as smoothing factor, eccentricity and shape factor of the blade are used, and five texture features are extracted from the grayscale image. Five eigenvalues are selected by principal component method, and 10 plant species are selected. Classification, with an average accuracy of 90%. In Literature [6], the color characteristics of the tomato nutrient-deficient leaf color image were extracted. In the RGB color model, the mean value, standard deviation, variance characteristic value of the color value and the correlation coefficient between the three-color values RGB were used to remove. The white background effect research in the image can better identify the tomato leaves with deficiency, and the recognition rate is above 70%. In the literature [7], four kinds of dicotyledon weeds and two kinds of monocotyledonous weeds were selected as the objects, and the fractal dimension of the RGB three-color image of the leaves was calculated respectively. The average value was used as the fractal dimension of the weed leaves to identify the weed class. Literature [8-10] proposed a color image segmentation method that can distinguish between monocots and dicots under natural conditions, as well as identify crops and weeds.

2. IMAGE ACQUISITION

Inner Mongolia Autonomous Region grassland resources is the first of the well-deserved Chinese grasslands. The vast area and abundant resources make the Inner Mongolia prairie an important base for the production and breeding of natural animal husbandry in China. The experimental images in this paper were collected in the desert steppe in the Xilin

Gol League of Inner Mongolia Autonomous Region. The base has an average elevation of 1345m and belongs to the mid-temperate semi-arid continental monsoon climate zone. The shooting time is 14:00 on September 15, 2017. Under the natural light intensity, the intelligent navigation information collection vehicle was used to collect the image of the two plants of Lemus chiesas and Gray green quinoa. The collected images of different sizes and shapes of the leaves were taken as samples. The image format was JPG and the image was MATLAB. 2012a is processed.

The image acquisition equipment is an intelligent navigation information collection vehicle researched and developed by the research group. The intelligent navigation vehicle is mainly composed of the following eight parts: body and power system, STM32 embedded microcontroller and environmental monitoring system, solar power supply system, image information acquisition system, GPS positioning system, mechanical excavation system and obstacle avoidance operation system.

The video camera in the environmental monitoring system uses the DH-IPC-HFW1100(5)D high-definition network camera developed by Zhejiang Dahua Technology Co., Ltd., which uses a high-performance megapixel CMOS image sensor with an effective pixel of 1280(H)×720. (V), in line with the IP66 waterproof design, installed in the middle of the intelligent navigation information collection vehicle, capable of full-scale image acquisition. There are two modes of image acquisition: first, automatic capture of grassland pasture information by controlling the camera pan/tilt; secondly, analyzing the memory video file and intercepting the effective image information frame to obtain the grassland pasture image. This topic uses the first method to acquire image information.

3. FEATURE EXTRACTION

3.1 Image Preprocessing

Image preprocessing is the basis of image analysis, recognition and understanding, and its effect directly affects the accuracy of subsequent steps. In order to extract the shape features, the three kinds of forage blade images need to be preprocessed. Due to the length of the relationship, the image pretreatment was illustrated by taking goose down. In order to achieve the purpose of shape feature extraction, the blades of the above image are processed as follows: grayscale, binarization, morphological filling, minimum circumscribed rectangle, area calculation, perimeter calculation after edge detection, and the like.

Grayscale images differ from color images in that each pixel has only one color. Grayscale images usually display grayscale from the darkest black and the brightest white. The color image is composed of three channels of R, G, and B, and the respective displays of the three channels are displayed in gray scale. Under the premise of ensuring information integrity, color image graying can greatly reduce the computational complexity of image processing, improve computational efficiency, and reduce computation time.

3.2 Texture Feature Extraction

The feature extraction and identification of typical forages will provide a theoretical basis for the realization of scientific and rational grazing strategies, grassland management and research on grass and animal balance for the digitization and scientific evaluation of grassland information. Therefore, how to properly select and accurately extract the feature information of the forage image and express it in an appropriate way will directly affect the efficiency and accuracy of image segmentation. The texture feature is a holistic feature. As a feature commonly used in the field of image recognition, it is a feature that uses computer technology to calculate the relevant values from the image for description. Because of the different understanding and understanding of texture, the definition of it is different, and the extraction method of texture features is also different. The purpose of texture feature extraction is to use some mathematical parameters to describe the texture information in the image (image orientation, regularity, etc.) as parameters of image segmentation or to identify classification input data.

3.3 Gray-gradient Co-occurrence Matrix Algorithm

The gray level co-occurrence matrix reflects the change of image gray level, the correlation of adjacent pixels, and the frequency of occurrence of two pixels of the same brightness. It cannot be directly used to describe texture features. It is necessary to calculate energy, entropy, and Inertial, correlation, etc., using these eigenvalues to describe the texture features of the entire image. The gray gradient co-occurrence matrix algorithm first divides the image into N sub-regions of the same size, calculates the value of the gray-gradient co-occurrence matrix of each sub-region, and uses the average of the eigenvalues of all sub-regions to represent the feature quantity of the image. The texture features of the image can be better represented, and the features of the image rotation are more accurate. The calculation of this method is much smaller than the calculation of the whole image, and the whole calculation process is simple and the time is short.

The gray-gradient co-occurrence matrix is defined by the gray matrix $F(m,n)$, and the gradient matrix $G(m,n)$. The two matrices jointly count the frequencies of the pixel pairs of $F(m,n)=i$ and $G(m,n)=j$, which appear in the image. Normalizing this frequency is the gray gradient. The value of the (i,j)th element in the co-occurrence matrix. The gray gradient co-occurrence matrix is developed from the gray level co-occurrence matrix,

and combines the gradient information based on the gray information to extract energy, entropy, inertia, correlation, difference, inverse moment, and average, and Variance, entropy, variation difference, difference entropy, mutual information metric, maximum correlation coefficient, maximum probability, dissimilarity, contrast, middle finger, uniform, dark clustering and prominent clustering, total 20 secondary characteristic parameters。

According to their respective meanings and experimental results, the eigenvalues of the texture features are repeatedly described in the 20 parameters, so the four main eigenvalues can be selected for characterization, that is, the characteristics of energy, entropy, inertia and correlation are used. Characterize texture features. When extracting texture features using gray level co-occurrence matrix, gray level compression should be performed first to reduce the amount of calculation. Then the distance of the moving point, the four co-occurrence matrices generated by the four directions, and the normalization of the four matrices, respectively, the four important texture eigenvalues of the four matrices, the eigenvalues of the four directions the summed average is taken as the final texture feature value. A set of parameter values for pasture leaf texture features are shown in the table.

Table 1 Leaf texture feature parameter value

parameter	energy	entropy	Correlation	inertia
Phlomis umbrosa	0.9323	0.2361	1.1324	0.1129
Goose down	0.8356	0.9362	0.3897	0.4582
Leymus chinensis	0.8452	0.5634	0.3992	0.5423

We selected 4 kinds The texture feature description can be performed on behalf of the invariant rotation amount of the texture feature. Let the gray level of the image be L and the gradient level be Lg. The four main parameters are as follows:

energy:

$$T_1 = \sum_{i=0}^{L-1}\sum_{j=0}^{L_g-1} \hat{H}^2(x,y) \tag{1}$$

Correlation:

$$T_2 = \sum_{i=0}^{L-1}\sum_{j=0}^{L_g-1} (i-T_h)(j-T_i) H(\hat{x},y) \tag{2}$$

Gray entropy:

$$T_3 = -\sum_{x=0}^{L-1}\sum_{y=0}^{L_g-1} \hat{H}(x,y) \log \sum_{y=0}^{L_g-1} \hat{H}(x,y) \tag{3}$$

Gradient entropy:

$$T_4 = -\sum_{y=0}^{L_g-1}\sum_{x=0}^{L-1} \hat{H}(x,y) \log \sum_{x=0}^{L-1} \hat{H}(x,y) \tag{4}$$

4. LEAF TEXTURE RECOGNITION BASED ON BP NEURAL NETWORK

Pattern recognition, also known as image recognition, distributes the objects to be identified into classes by computer using digital techniques, either automatically or with little human intervention, by processing and analyzing the information that characterizes the features of the object. Learning is a fundamental and important step in the pattern recognition process. The basic principle block diagram of the pattern recognition system can be divided into two parts: the identification process and the learning and training process. When using pattern recognition for classification, the appropriate identification method should be adopted according to the actual situation. The specific classification and identification system and process are different. There are many algorithms for pattern recognition, but different theories and methods are needed for different objects and different purposes. In recent years, the artificial neural network method has developed rapidly. It can adapt to more complex feature spaces and has many advantages such as self-learning function. Therefore, from the actual needs, the network is used for identification and classification.

BP neural network was constructed under the environment of Matlab 2012a neural network toolbox to realize image classification of two pastures. The number of nodes in the input layer is a characteristic parameter after dimension reduction, and the number of output nodes is equal to the number of division classes of the sample, so the input node number of the BP network is 10 The number of output neurons is 2, which is represented by binary (0, 1) and (1, 0), which respectively represent the Leymus chinensis region and the gray-green sputum region. The BP neural network is shown in Fig. 5.

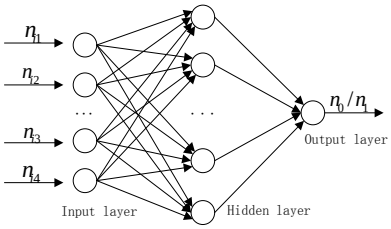

Fig. 5 Diagram of BP neural network

In general, the hidden layer selects the S-type activation function. The theory proves that a network of S-type hidden layers and a linear output layer can approximate any rational function. The single layer hidden layer can solve the linear problem. The double layer hidden layer complicates the network, the network training time is lengthened, the generalization ability is reduced, but the error precision can be improved. When the forage leaf is identified and classified, the whole system is relatively simple, and the single layer of the hidden layer can be selected to achieve the goal. This test is calculated with reference to the formula of the number of classical hidden layer nodes:

$$n = \sqrt{(n_i + n_0)} + a \tag{5}$$

Where n is the number of hidden layer nodes; n_i is the number of input nodes; n_0 is the number of output nodes; a is a constant between 1 and 10. The number of input nodes in this subject is 10, the number of output nodes is 2, and the selection range of the hidden layer is calculated by equation (5) to be 4~13. Experiment with them separately. When the number of hidden layer nodes is 10, the performance of the network can reach the optimal state.

5. EXPERIMENT

In the experiment, the image after graying has 256 gray levels, and directly generating the gray level co-occurrence matrix will generate a large amount of calculation, which affects the running speed of the algorithm. Therefore, under the condition that the effect is small, the gray level is compressed. Choose to compress the image to 32 gray levels. The specific process of the algorithm is as follows: (1) Obtain the gray matrix of image $M \times N$, and calculate the $(N-1)\times(M-1)$ gradient matrix of the image by square summation. The gradient matrix is one dimension less than the gray matrix, ignoring the outermost periphery of the gray matrix. (2) Calculate the gray-gradient co-occurrence matrix through the gray matrix and the gradient matrix, and normalize it to facilitate subsequent feature extraction. The equal-quantity quantization greatly reduces the computational complexity.

It can be seen from the analysis of Fig.1-4 that the energy values of the three forage leaf images are not much different, that is to say, the gray scale distribution of the image is the largest correlation value of the sugar stalk, that is, the gray correlation of the image is large, and the sheep The correlation value of grass is the smallest, and the difference is in the order of magnitude; among the gray entropy and gradient entropy, the Leymus chinensis and the tauline stalk are relatively close, and the brown stalk is obviously slightly higher, that is, the information contained in the image of the leaves of the succulent and the succulent Large, Leymus chinensis leaves contain less information. From this analysis, the gray gradient co-occurrence matrix algorithm can extract the texture rotation invariant effectively and accurately, that is, it is not sensitive to the rotation of the image. Therefore, this algorithm is used to extract the texture features and calculate all the samples in the experimental sample library. The texture feature value provides data for the next network identification.

A total of more than 1000 images were selected in this study. After learning and training through BP neural network, a classification model of images was established. It is simpler and more convenient than double-layer hidden layer implementation, so it is widely used. The number of hidden layer nodes is too small, and the ability of the network to obtain information from the sample is weak, which makes it impossible to accurately identify and classify; if the number is too large, there may be excessive learning, and the irregular content such as noise in the sample is Learning has led to a decline in the ability to identify classifications. Increasing the number of hidden layer nodes affects the convergence speed and increases the training time. The transfer function of the hidden layer and the output layer is tan-sigmoid(), trainlm() is selected as the training function, the weight learning function is selected as learngdm(), and the training step epochs is set to 1200, and the mean square error evaluation index is used. For the training of the network, the purpose is to obtain a network with the highest recognition rate, appropriate convergence step, and small error, that is, the network with the best network performance. Table 2 shows the variation of the partial classifier recognition result with the number of hidden layer nodes.

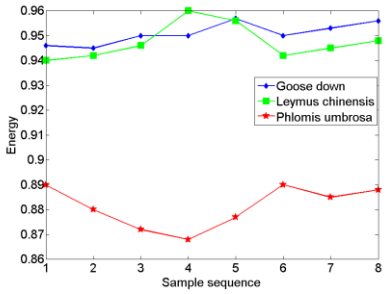

Fig. 1 Pasture energy

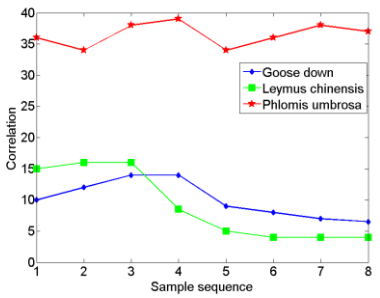

Fig. 2 Pasture correlation

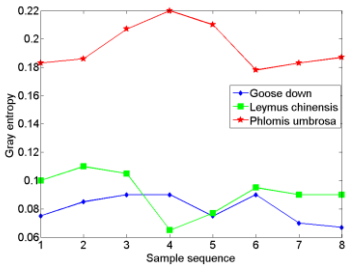

Fig. 3 Grey entropy of pasture

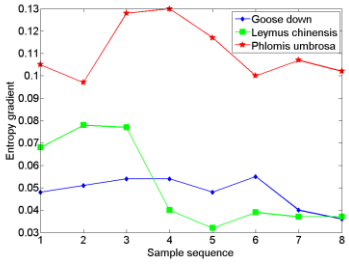

Fig. 4 Grassland gradient entropy

Table 2 The result of the classifier recognition result varies with the number of hidden layer nodes

Number of hidden layer nodes	8	9	10	11	12	13	14
Convergence step	35	26	28	25	22	26	29
Network performance (10^{-2})	2.89	1.67	2.78	1.63	2.24	1.27	1.21
Average recognition rate(%)	89.3	91.2	90.2	89.4	93.9	88.4	90.1

It can be seen from Table 2 that when the number of hidden layer nodes is 12, the performance of the network can reach the best state, the highest accuracy rate is 93.9%, and the convergence step length is 22.

In addition, for the selected experimental images, the method of this paper is compared with several literature methods introduced. The results are shown in Table 3. It can be seen that the method has obtained the best recognition result and proved the accuracy of the method.

Table 3 The comparison with several methods described in the literature

method	Method of this paper	Literature [1] method	Literature [3] method	Literature [5] method	Literature [6] method	Literature [7] method
Average recognition rate(%)	**93.9**	91.2	90.9	88.3	89.2	87.8

6. CONCLUSION

Grassland digital management is an important means to protect ecosystems and develop animal husbandry. It is an important way to achieve sustainable development strategies and an important process to improve the automation of animal husbandry. The basis and key link to realize the digital management of grassland is the automatic identification and classification of pasture.

In this paper, the image recognition technology is used to study the automatic identification method of forage grass. For the desertification grassland, the image of pasture leaves collected by the scientific research base of Xilin Gol League in Inner Mongolia is selected as the object: three kinds of pastures: Leymus chinensis, Goose down, and Phlomis umbrosa. Texture feature technology enables automatic identification and classification. The experimental results show that the recognition method based on the gray-gradient co-occurrence matrix algorithm can achieve 93.9% recognition accuracy. The future hopes to further improve the method of this article.

REFERENCES

[1]Abadi M, Capellelaizé A S, Khoudeir M, et al. Grassland species characterization for plant family discrimination by Image Processing. Image and Signal Processing, International Conference, Icisp 2010, 2010: 173-181.

[2]Ledoux A, Richard N, Capelle-Laizé A S, et al. Toward a complete inclusion of the vector information in morphological computation of texture features for color images. International Conference on Image and Signal Processing, 2014: 222-229.

[3]Vartanian M, Nijland W, Coops N C, et al. Assessing the impact of field of view on monitoring understory and overstory phenology using digital repeat photography. Canadian Journal of Remote Sensing, 2014, 40(2): 85-91.

[4]Montalvo M, Pajares G, Guerrero J M, et al. Automatic detection of crop rows in maize fields with high weeds pressure. Expert Systems with Applications An International Journal, 2012, 39(15): 11889-11897.

[5]Kulkarn A H, Rai H M, Jahagirdar D K A, et al. A leaf recognition technique for plant classification using RBPNN and zernike moments. Journal of Computer-Mediated Communication, 2013, 2(1): 984-988.

[6]Zhu W J, Mao H P, Liu H Y, et al. Study on the polarized reflectance characteristics of single greenhouse tomato nutrient deficiency leaves. Spectroscopy & Spectral Analysis, 2014, 34(1): 145.

[7]Cheng S, Chen Y, Lin P, et al. Identification of weeds based on fractal dimension analysis of time series of weed leaf chlorophyll. African Journal of Agricultural Research, 2011, 6(14): 3363-3368.

[8]Nikolaev D P, Nikolayev P P. Linear color segmentation and its implementation. Computer Vision & Image Understanding, 2004, 94(1): 115-139.

[9]Taler P, Sabo K. Color image segmentation based on intensity and hue clustering - a comparison of LS and LAD approaches. Croatian Operational Research Review, 2014, 5(2): 375-385.

[10]Andújar D, Ruedaayala V, Moreno H, et al. Discriminating crop, weeds and soil surface with a terrestrial LIDAR sensor. Sensors, 2013, 13(11): 14662-75.

Application of power electronics technology in green lighting

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Abstract: In recent years, the rapid development of China's economic construction has promoted the rapid development of various industries in China, while China has rapidly entered the stage of modernization. In recent years, the rapid development of power electronics technology has led to higher performance of various power electronic devices, and many devices with high efficiency, energy saving, stable control and high conversion efficiency are widely used in power systems and lighting systems. In the future development of power electronics technology.
Keywords: Power electronics technology; Green lighting; Application

1. INTRODUCTION

With the rapid development of China's economy and the improvement of people's living standards, China has made great progress in improving environmental protection and energy conservation [1]. Energy conservation and environmental protection are among the most important tasks in today's society [2]. In the past, the electricity consumption mode caused great waste of power resources, and at the same time, it also generated greenhouse gases, which was not conducive to people's living environment protection. "Green lighting" is an image of the international energy conservation and environmental protection lighting system in the early 1990s. With the birth of green lighting technology, it has gradually promoted the use and reduced the damage and impact on the environment.

2. IMPACT OF POWER DLECTRONICS TECHNOLOGY ON GREEN LIGHTION TECHNOLOGY

Save energy. At present, during the operation of the electric energy system, the electric energy consumed by the lighting system is very large, so it is necessary to strengthen the energy-saving treatment of the lighting system. The proper use of electronic technology in green lighting technology can reduce the energy consumption during the operation of the lighting system, thereby achieving energy conservation. For example, in the green lighting system, energy-saving lamps can be used to achieve efficient use of IGBT ballasts [3]. Based on the application of rectifier equipment, the current can be reasonably optimized and adjusted to convert it into 50 kHz AC power, which will significantly improve the utilization efficiency of energy-saving lamps. Finally achieve energy saving goals. In addition, in the green lighting system, electronic technology and sensing technology can also be applied to achieve energy saving purposes, such as rectification technology, frequency conversion technology, etc., in a practical application, reasonable and automatic regulation of electrical energy. 2. Protect the environment. In the actual operation process, traditional lighting systems will produce a lot of greenhouse gases, which will seriously affect the ecological environment and will also have an impact on people's health. In recent years, green lighting technology has continued to develop, and the application of power electronics technology to lighting systems has been continuously solved, effectively solving these problems. For example, the application of sensors in smart LED lighting (Figure 1) can effectively improve the automation of lamps, and the cost of the lighting equipment does not involve harmful elements such as mercury, so the lighting system can reduce the impact on the environment and damage in actual operation. At the same time, in the process of gradual improvement and optimization of power electronic resonant switching technology, zero-voltage switching has been widely used in reactive power compensation, which not only can greatly reduce energy consumption, but also significantly reduce the influence of harmonics on the environment. Finally, the purpose of environmental protection is achieved.

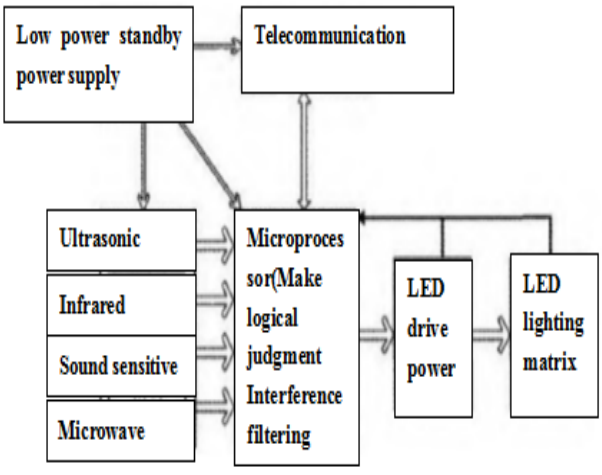

Figure 1 Application sensor in smart LED lighting

3. APPLICATION OF POWER ELECTRONICS

TECHNOLOGY IN GREEN LIGHTING TECHNOLOGY

3.1 Fiber Optic Lighting Technology

Fiber optic illumination is a new type of green illumination. Fiber optic illumination directly uses sunlight as a light source. It is non-heat-conducting, non-radiative, and can change colors at will, with long service life and low light loss. Green energy saving and environmental protection, is widely used in various office lighting decoration, architectural lighting, museums, exhibition halls and other cultural relics lighting, waterproof, explosion-proof, anti-electric oil depot, coal mine area is strictly prohibited to enter the dangerous occasion lighting. Fiber optic lighting can save power resources, reduce environmental pollution, and improve energy efficiency. Therefore, the development prospect of fiber optic green lighting is immeasurable. When the sunlight hits the mirror, a similar parallel light is generated, and the parallel light is irradiated to the color filter. The color filter uses its function to convert the parallel light into colored light, and the colored light is transmitted through the optical fiber, along the optical fiber. The route enters the room for illumination. Optical elements such as lenses and mirrors are used to change the direction of light propagation, so that light can be flexibly propagated, resulting in large-scale development of fiber optic illumination.

3.2 High frequency AC Electronic Ballast Technology

The commonly used high-frequency AC electronic ballast circuit in China is similar to the single-stage half-bridge resonant inverter circuit. This circuit adopts few components and low cost. Although it is widely used, it also has many shortcomings. The circuit directly supplies power to the inverter circuit after rectification, so it will generate high-order harmonic pollution, and the electromagnetic interference generated during high-frequency operation will affect the normal operation of other equipment, and the circuit will make the three-phase grid potential during the working process. Offset, changing the three-phase equilibrium state in the grid. When the electronic ballast is not required to be fully powered, the dimming control can achieve significant energy saving effects. The dimming control rule can fully utilize the function of the pulse to ensure that the two switching tubes are not damaged when they are simultaneously turned on. The dimmer switch needs to change the control angle of the power electronics to change the output waveform to adjust the output voltage. Therefore, when the light is low or low, the voltage is low and the current is reduced, achieving energy saving.

3.3 Soft Switching Technology

The key is to use resonant electronic components to form a resonance in the circuit. Before the switch is closed or opened, we first reduce the current in the circuit to zero, which can eliminate the possibility of current and voltage overlap in the circuit, thereby fundamentally reducing the current frequency. Change rate of change. In other words, soft switching technology can improve the safety of lighting products by controlling the interference of electromagnetic waves on lighting systems, reduce the volume and quality of products, reduce the loss during use, and reduce the use. Noise in the process.

3.4 Application in Intelligent Lighting Control System

In the process of continuous improvement of people's quality of life, higher requirements are also placed on the lighting system in life. Intelligent lighting control system is one of the key subsystems of intelligent control system. It mainly uses advanced electronic induction technology and electromagnetic voltage regulation technology to track and monitor the power supply in real time, and realize automatic and smooth adjustment of circuit current and voltage amplitude. Due to the extra power generated by the unbalanced load in the lighting circuit, the power factor can be significantly increased, the operating temperature of the line and the lamp can be lowered, and the power supply operation state can be optimized. The lighting control system can not only meet the different lighting effects of different audiences, but also optimize the working environment and promote people's work efficiency. During the application of the system, the actual light sensitivity and lighting effects of each area can be automatically adjusted, and the unmanned area can be automatically turned off. In addition, the system can also use programming to dynamically adjust the lighting conditions, so that the lighting system can meet the different needs of lighting in different occasions. In the current intelligent building design, the intelligent lighting control system has already belonged to a core design component, which not only can improve the comprehensive management level of buildings, but also can automatically control the lighting system.

4. DEVELOPMENT TREND OF POWER ELETRONICS TENHNOLOGY

The first is stealth integration modularity. The integrated and aggregated power supply occupies an important component in the power supply family, and its integrated modularization makes the power supply volume gradually reduced, which is the core of intelligent integration of power electronic devices. Due to the continuous maturity of the soft-switching technology, the switching frequency of the device is continuously increased, which makes the device volume decrease continuously, and integrates modules with other kinds of functional devices to enhance the functionality of the device. Therefore, the technicalization of the stealth integrated module will be rapidly developed, enhance the performance of the green lighting system, and provide a strong guarantee for the development of green lighting. The second is high-speed and high-speed. With the modernization of

power electronic devices, the operating frequency of power electronic devices continues to increase, the speed of integration continues to accelerate, the conversion efficiency continues to increase, and the devices such as shutdown devices can be controlled. The structural functions of power electronic devices are continuously enhanced and the volume is continuously reduced. Power electronics technology will tend to be high-speed and high-frequency. The third is full control digital intelligence. In order to change the shortcomings of traditional lighting devices such as high energy consumption, single control mode and low safety factor, modern power electronics technology integrates information processing devices and power conversion to improve device safety and reduce manufacturing costs. And combined with the full control device, the intelligent module is formed, and the traditional analog signal is replaced by the digital signal to realize the predetermined function. Such device is convenient, flexible, accurate and intelligent in use, and will be widely used. The fourth is green and new energy. With the continuous improvement of modern science and technology, the performance of power electronic devices continues to improve, and power electronics technology and green lighting technology continue to develop in the direction of high efficiency, energy saving and green pollution.

5. CONCLUSION

With the continuous improvement of people's living standards, people have put forward higher requirements for lighting systems. By rationally applying and integrating power electronics technology in green lighting technology, we can effectively optimize and improve the green lighting system to create a rational and natural life for people. surroundings. Therefore, relevant technical personnel are required to have a deep understanding of the development trend of power electronics technology and the impact of the technology on green lighting technology, and the rational application of power electronics technology in green lighting technology to promote the further development of green lighting technology.

REFERENCES

[1]Zhang Weihao. Development and application analysis of power electronics technology. Science and Technology Innovation, 2017(34): 186-187.

[2]Li Daxing, Luo Wei. Application of new energy-saving devices based on advanced power electronics technology in urban green lighting engineering. Electrical Applications, 2017, 36(2): 20-24, 65.

[3]Wang Jiao, Gu Bo, Wei Wei. Application analysis of power electronics technology in green lighting system. Electronic World, 2017(3): 92+94.

Application prospect of layered MoO_3 in semiconductor devices

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Abstract: The characteristic scale of the device has entered the nanometer scale, the heat generated by the processor operation is difficult to eliminate, and the traditional semiconductor technology has approached the limit of physics. Therefore, it is urgent to find new materials that can replace semiconductor silicon. Layered MoO_3 is a kind of high dielectric material with adjustable electronic properties. It is an intrinsic semiconductor with natural band gap and has a broad application prospect in electronic devices.
Keywords: semiconductor; MoO_3

1. INTRODUCTION

In the past 50 years, the silicon-based semiconductor industry has made great achievements, and information technology has developed rapidly according to Moore's law. However, as the characteristic scale of the device enters the nanometer scale, it is difficult to eliminate the heat generated by the processor operation, Traditional semiconductor technology is approaching the limits of physics. Therefore, it is urgent to find new materials that can replace semiconductor silicon. We're looking at layered molybdenum trioxide, which has three crystal structures, The interlayer is connected by van der Waals force, and the two-dimensional layered structure can be obtained by stripping through van der Waals functional, and the structure can be optimized by optB88 function. Then, what are the advantages of molybdenum trioxide in semiconductor devices? We will illustrate this by comparing it with other layered materials.

2. PERFORMANCE DEFECTS OF OTHER LAYERED MATERIALS

In recent years, the booming development of graphene has also inspired the further study of other two-dimensional (2D) atomic crystals, such as graphite, hexagonal boron nitride, molybdenum trioxide, metal sulfide, etc. At present, a large number of 2D materials have been identified, such as MoS_2, showing the characteristics of indirect bandgap semiconductor, while two-dimensional monolayer MoS_2 is a direct bandgap semiconductor with a bandgap width of ~1.9Ev [1], which will have a place in the future nano-electronical appliance and optoelectronic neighborhood. As a raw material used to peel nanometer sheets, layered compounds have attracted more and more attention.

Due to its unique physical and chemical properties, two-dimensional (2D) layered materials have recently attracted the interest of many researchers. They have potential applications in electronics, photoelectrons, energy storage and catalysis. Compared with their 3D materials, they show different structural, electronic and optical properties, such as significant changes in electron band structure, spin orbital splitting and enhanced photoluminescence [2]. Most of these properties are intrinsic to the monolayer, but no longer exist for their crystal.

(1) Graphene

By far the most popular two-dimensional material is graphene. Since the successful separation of graphene with only one atom thickness from graphite in 2004 [3], the discovery has shown that it is possible to produce layered two-dimensional (2D) materials with a single atom thickness, and therefore many methods have also been developed to promote understanding of the unique properties in a single layer. Graphene is a single layer of graphite. Its two-dimensional structure is made up of carbon atoms with sp2 hybrid orbitals, which are arranged in a honeycomb structure. It is one of the thinnest materials available. The honeycomb structure of graphene contains two equivalent lattices, causing its conduction and valence bands to intersect at K point in the brillouin region, forming a linear band dispersion relationship [4].Therefore, the carrier in graphene is a kind of weightless Dirac fermion, which gives it unique electrical properties, such as high carrier mobility (~ 200,000 $cm^2v^{-1}s^{-1}$) [5-7], leading to high thermal conductivity [8] and excellent mechanical strength [9,10] when observing the quantum spin hall effect at room temperature. In addition, in terms of optical properties, graphene is almost completely transparent, absorbing only 2.3% of light [11,12]. These excellent properties enable graphene to play different roles in people's lives and bring great changes to human development. But graphene still has some drawbacks and needs to be regulated for specific uses, For example, transistors need an appropriate switching ratio in the current between the on and off states, However, the linear band dispersion relationship of graphene, which leads to a very low switching ratio of its devices, and the lack of band gaps that prevent graphene from being used in transistor devices, have hindered the development of graphene in current semiconductor technologies. Therefore, researchers used various

methods, such as cutting nanoribbons with arm-chair configuration [13,14], to create a band gap in graphene. However, they found that the carrier mobility of graphene was significantly reduced when the band gap was generated by some methods. So while graphene is a promising material, the limitations of its electronic structure have inspired researchers to explore other 2D materials. Examples include boron nitride (h-bn), transition metal sulfide (TMC), and molybdenum oxide.

(2) Molybdenum disulfide

Besides graphene, transition metal sulfide (TMC) is one of the most studied ultra-thin materials. The two-dimensional transition metal sulfide has a feature of diversity because of its more than 40 kinds of constituent elements. Due to its diversity, it exhibits a wide range of different electronic properties, from non-magnetic to magnetic, from gold to semiconductor [15]. In these materials, MoS_2 most has the characteristics of the block structure is an indirect band gap semiconductor, and single MoS_2 has direct band gap of ~1.9 eV [1], and received great attention in physics and nano electronics, because of its good additions semimetal graphene and insulating h-BN monolayer as used in the structure of the flexible 2d electronics components, in the laboratory has been successfully applied to the transistor and other electronic and optoelectronic devices based materials [16]. MoS_2 is also a good semiconductor material, with the same effect of electron transfer, MoS_2 can be thinner and smaller than silicon film, this is due to the single molecular layer of MoS_2 is a two-dimensional material structure, while silicon is three-dimensional. Therefore, molybdenum disulfide is expected to be more widely used in ultra-small transistors, light-emitting diodes and solar cells. However, there are some limitations in the study of two-dimensional MoS_2, mainly its large area and high quality preparation. There are various types of defects in MoS_2, which makes the characterization of defect types and the understanding of their physical properties extremely important in this material [17].

(3) Black phosphorus

In 1914, American scientist Bridgman prepared black phosphorus by high-pressure method [18], which was the most stable one in phosphorus allotropes. However black phosphorus didn't get much attention until 2014, when research on it exploded. Since this year, new properties and applications of black phosphorus in single or thin layer materials have proliferated. Because of its unique planar anisotropy [19], it is possible to manufacture new electronic and photonic devices [20,21]. Theoretical studies have predicted that monolayer black phosphorus has a high hole mobility up to 10000 $cm^2v^{-1}s^{-1}$ [21], and its electronic properties can be further regulated through the number of layers and interlayer strain [22], because of these excellent properties, many electronic devices have been developed, such as photosensitive transistors and field-effect tubes [20,21]. In addition, due to the anisotropy of black phosphorus in the plane, its crystal structure presents a honeycomb shape, leading to some new physical properties such as negative out-of-plane poisson's ratio [23]. Black phosphorus has unique mechanical and thermal properties. It is extremely soft in the armchair direction and can withstand 30% stretching [24]. Therefore, as a new two-dimensional nanometer material, black phosphorus has a great application prospect in nanometer light and electron field. Compared to other allotropes, bulk black phosphorus are relatively stable in air and can last for several months. However, in optoelectronic device applications, the two-dimensional material black phosphorus is only a few layers or a single layer compared with similar graphene and transition metal sulfides. However, when the single and few layers of black phosphorus are exposed to water and oxygen in the air, it cannot remain stable for a long time. This instability limits the practical application of black phosphorus in electronic devices.

3. ADVANTAGES OF MOLYBDENUM TRIOXIDE

To sum up, the existing two-dimensional materials have less overall properties than commonly used silicon, so it is inevitable to find new two-dimensional materials with natural band gap, stable chemical properties and high carrier mobility.MoO_3 is a kind of high dielectric material, which has adjustable electronic properties, belongs to intrinsic semiconductor, has natural band gap, and has a broad application prospect in electronic devices. The weak van der Waals forces between the two layers of MoO_3 can be easily stripped into a two-dimensional layered structure. Its bandgap width is about 3.0 eV, and the bandgap width varies according to the crystal structure, all of which belong to n-type wide-bandgap semiconductors [25]. Ideal MoO_3 materials are not suitable for direct application in real electronics devices due to the large gap between MoO_3 and carrier concentration. However, Balendhran et al. [26] successfully fabricated a field-effect transistor using a layered MoO_3 material containing oxygen vacancies, and found that its carrier mobility was greater than 1100 $cm^2v^{-1}s^{-1}$, much higher than MoS_2, which has been widely concerned in recent years, bringing new hope for the development of low-dimensional electronics devices. On the other hand, why layered MoO_3 with large bandgap can be an efficient electronic material is also of great interest. Therefore, it is of great significance for the application of MoO_3 in electronic devices to explore carrier mobility of layered MoO_3 materials and further study its potential mechanism.

The prospect of layered molybdenum trioxide materials in electronic devices also arouses theoretical interest. At present, there are a lot of theoretical researches on MoO_3 at home and abroad. Previous studies have proved that the widely used LDA/GGA

method cannot accurately consider the van der Waals interaction between the layers of MoO_3 and seriously underestimate its band gap. Efforts have also been made to accurately study MoO_3. Lei and Chen [27], for example, studied the properties of molybdenum trioxide on the block and surface by means of density functional addition U (DFT+ U) and tested the adsorption of hydrogen atoms. It was found that individual hydrogen atoms preferred to stick to asymmetrical oxygen atoms, and that the oxygen atoms at the ends were a good place to hold two hydrogen atoms. Water is more likely to bind to the site of the terminal oxygen defect, a calculation that differs from previous ideas. Shi et al [28] studied the basic process of catalyst vulcan on the surface of molybdenum trioxide (010). They applied density functional theory to a large area of clustering and found that the mutual reaction between sulfur and oxygen was positively superior to the adsorption of sulfur on the surface of molybdenum trioxide (010), and sulfur substitution was more likely to occur in the terminal oxygen O(1) site. Hartwin et al. [29] studied the van der Waals interaction between two-dimensional MoO_3 layers. Coquet and Willock [30] used GGA and GGA+ U to study the effect of oxygen vacancy on electron structure. Although there have been a lot of theoretical studies on MoO_3, there are still large errors between theory and experiment in crystal structure and electronic structure. Therefore, it is necessary to further study the application of molybdenum trioxide in semiconductor electronic devices, so as to provide a more reliable basis for the experiment.

REFERENCES

[1]Lembke D, Bertolazzi S, Kis A. single-layer MoS_2 electronics. Acc Chem Res, 2015, 48(1): 100-110.
[2]Heine T. Transition Metal chalcogenides: ultrathin inorganic materials with tunable electronic propertiess. Acc Chem Res, 2014, 48(1): 65-72.
[3]Novoselov K S, Geim A K, Morozov S V, et al. Electric fied effect in atomically thin carbon films. Science, 2004, 306(5696): 666-669.
[4]Novoselov K S, Geim A K, Morozov S V, et al. Two-dimensional gas of massless dirac fermions in graphene. Nature, 2005, 438(7065): 197-200.
[5]Mayorov A S, Gorbachev R V, Morozov S V, et al. Micrometer-scale ballistic transport in encapsulated graphene at room temperature. Nano Lett, 2011, 11(6): 2396-2399.
[6]Novoselov K S, Jiang D, Schedin F, et al. Two-dimensional atomic crystal. Proc Natl Acad Sci USA, 2005, (102): 10451.
[7]Geim A K, Novoselov K S. The rise of graphene. Nat Mater, 2007, 6: 183-191.
[8]Balandin A A, Ghosh S, Bao W Z, et al. Superior thermal conductivity of single-layer graphene. Nano Lett, 2008, 8(3): 902-907.
[9]Lee C,Wei X, Kysar J W, et al. Measurement of the elastic properties and intrinsic strength of monolayer graphene. Science, 2008, 321(5887): 385-388.
[10]Tsoukleri G, Parthenios J, Papagelis K, et al. Subjecting a graphene monolayer to tension and compression. Small, 2009, 5(21): 2379-2402.
[11]Kravets V G, Grigorenko A N, Nair R R, et al. Spectroscopic ellipsometry of graphene and an exciton-shifted van Hove peak in absorption. Phys Rev B, 2010, 81(15): 155413.
[12]Nair R R, Blake P, Grigorenko A N, et al. Fine structure constant defines visual transparency of graphene. Science, 2008, 320(5881): 1308-1308.
[13]Li X, Wang X, Zhang L, et al. Chemically derived, ultrasmooth graphene nanoribbon semiconductors. Science, 2008, 319(5867): 1229-1232.
[14]Wang X, Ouyang Y, Li X, et al. Room-temperature all-semiconducting sub-10-nm graphene nanoribbon field-effect transistors. Phys Rev Lett, 2008, 100(20): 206803.
[15]Xu M, Liang T, Shi M, et al. Graphene-like two-dimensional materials. Chem Rev, 2013, 113(5): 3766-3798.
[16]Lembke D, Bertolazzi S, Kis A. Single-layer MoS_2 electronics. Acc Chem Res, 2015, 48(1): 100-110.
[17]Heine T. Transition metal chalcogenides: ultrathin inorganic materials with tunable electronic properties. Acc Chem Res, 2014, 48(1): 65-72.
[18]Bridgman PW. Two new modifications of phosphorus. J Am Chem Soc, 1914, 36(7): 1344-1363.
[19]Xia F, Wang H, Jia Y. Rediscovering black phosphorus as an anisotropic layered material for optoelectronics and electronics. Nat Commun, 2014, 54458.
[20]Fei R, Yang L. Strain-Engineering the Anisotropic Electrical Conductance of Few-Layer Black Phosphorus. Nano Lett, 2014, 14(5): 2884-2889.
[21]Qiao J, Kong X, Hu ZX, et al. High-mobility transport anisotropy and linear dichroism in few-layer black phosphorus. Nat Commun, 2014, 54475.
[22]Rodin A S, Carvalho A, Castro Neto AH. Strain-induced gap modification in black phosphorus. Phys Rev Lett, 2014, 112(17): 176801.
[23]Jiang J W, Park H S. Negative poisson's ratio in single-layer black phosphorus. Nat Commun, 2014, 54727.
[24]Wei Q, Peng X. Superior mechanical flexibility of phosphorene and few-layer black phosphorus. Appl Phys Lett, 2014, 104(25): 251915.
[25]Sha X, Chen L, Cooper A C, et al. Hydrogen absorption and diffusion in bulk α-MoO_3. J Phys Chem C, 2009, 113(26): 11399-11407.
[26]Balendhran S, Deng J, Ou J Z, et al. Enhanced charge carrier mobility in two-dimensional high dielectric molybdenum oxide. Adv Mater, 2013, 25(1): 109-114.
[27]Yan Hua-Lei and Chen Zhao-Xu. DFT+U study of properties of MoO_3 and hydrogen adsorption on MoO_3

(010). J Phys Chem C, 2012, 116(49): 25757-25764.
[28]Shi X-R, Wang J, Hermann K. Theoretical cluster studies on the catalytic sulfidation of MoO_3[J]. J Phys Chem. C, 2010, 114(14): 6791-801.
[29]Peelaers H, Walle C GVd. First-principles study of van der Waals interactions in MoS_2 and MoO_3. J Phys Condens Matter, 2014, 26(30): 305502.
[30]Coquet R, Willock DJ. The (010) surface of α-MoO_3, a DFT + U study. Phys Chem Chem Phys, 2005, 7(22): 3819-28.

The Research about Different Varieties of Mushrooms' effects on the Absorption or Enrichment of Three Kinds of Heavy Metals and the Safety Limit Value

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Abstract: In order to study different varieties of mushrooms on law about the absorption or enrichment of three kinds of heavy metals and the safety limit value of heavy metals in the cultivational materials, We use two kinds of mushrooms in two mediums to do cultivational experiments through adding different concentrations of lead, cadmium chloride and nitrate arsenic trioxide., and next, gather the sporocarps. Then we respectively detect the contents of mushrooms' sporocarps, and Pb, Cd, As in the cultivational materials before bagging, and use the SPSS software to an analysis in the correlation between the obtained data. Results show that : The two mushrooms on the law about three kinds of heavy metal enrichment or absorption capacity is : Cd>As>Pb; Totally about ten regression equations are obtained; The values of R^2 are above 0.9, We fingered out eight Pb values by using these two mushrooms which are cultivated in the cotton seed shells or the corn cobs. The critical value of Pb are respectively 63.34,55.09 $mg \cdot kg^{-1}$;The critical value of Cd are 0.29, 0.41, 0.16, 0.40 $mg \cdot kg^{-1}$;The critical value of As are respectively 3.16,1.51 $mg \cdot kg^{-1}$.To conclude, different cultivational materials cultivate the same mushroom, or the same kind of cultivational materials culture different varieties of mushrooms .There are different laws between them.

Keywords: Mushroom; Heavy metals; Enrichment; Safety limit value

1. INTRODUCTION

Nowadays industrial and agricultural scraps are always used as medium in edible mushroom industry. and it is identified that heavy metals are much easier to be accumulated in edible mushroom fruit bodies. As a result of this, heavy metal pollution has seriously influenced the quality and food safety of edible mushroom[1]. So to keep a proper level of heavy metal content in medium and covering soil can improve the quality of edible mushroom and also make a great sense to the development of edible mushroom industry[2].

Edible fungus, which contain a lot of nutritions such as protein[3], amino acids, vitamins, are a delicious and healthy food. However, as the emission of industrial waste, the use of pesticides and herbicides containing different heavy metals, the sources diversification of cultivation materials of edible fungus increasingly outstanding[4]. Therefore, we need to control the content of heavy metals in edible fungi to enhance the food safety of edible fungi which has far-reaching significance to the edible fungus industry in China.

In this research, the main cultivars such as two different varieties of mushrooms were used as the experimental species, and three methods were taken by selecting different mediums, or adding Pb, Cd, and As of different concentrations in mediums, or adding Pb, Cd, and As of different concentrations in covering soil[5]. Effects of heavy metal content in medium or casing soil on the product security of edible mushroom had been analyzed. The capacity of edible mushroom fruit bodies in accumulating Pb, Cd, and As had been researched.

2. MATERIALS AND METHODS

2.1Experimental Materials

2.1.1 Test strain

Two different varieties of mushrooms P-5 and P-8, Zhoukou academy of agricultural sciences, providing by Zhoukou Academy of Agricultural Sciences[6].

2.1.2 Experimental reagents

Concentrated nitric acid, concentrated sulfuric acid, hydrogen peroxide solution, perchloric acid, sodium hydroxide solution, arsenic trioxide, cadmium chloride, lead nitrate, 75% ethanol, deionized water, all above reagents are analytical pure;

Lead standard solution: 0.16 g lead nitrate, 10 mL hydrogen nitrate, 1000 mL water.

Cadmium standard solution: 2.03 g $CdCl_2$ $2H_2O$, 1000 mL water;

Arsenic standard solution: 1.32 g As_2O_3, 1.20 mL Sodium hydroxide solution（0.1 $g \cdot mL^{-1}$）,1000mL water[7].

2.1.3 Experimental instrument

JD200-3 electronic balance, Shenyang Longteng Electronics Co., Ltd;SW-CJ-2FD super-clean worktable Suzhou City Gold Purification Equipment Technology Co., Ltd; UV-5100 UV vis Spectrophotometer , Shanghai Metash Instruments

Co., Ltd; JJ-2 Kinematica, Jintan Jieruier Instrument Manufacturing Co., Ltd.

2.1.4 Mediums

Culture Medium Components: Cotton Seed Hull 85%, bran 15%, ratio of material to water 1:1.2, under natural pH;

Corn cob 85%, bran 15%, ratio of material to water 1:1.2, under natural pH;

2.2 Experimental

2.2.1 Experiment process

Using Cottonseed hull and corncob as Major cultivating materials with different concentration of heavy metal solution were stirred until homogenous.

The final concentrations of heavy metals Pb, Cd and as were shown in tables 1, 4 and 6, and every cultivating material repeated 9 times. In this experimental, control group was established. The heave metals were not added into the samples in the control group. The remaining experimental steps were the same to the experimental groups[8].

loading into high density polyethylene bag(33 cm *17 cm *0.04 cm) in each bag of 0.10 kg(wet weight) after cultivating material treatment, and allow it to cool in a sterile environment after disinfection by high temperature, high pressure, then vaccinated two kinds of mushrooms P-5 and P-8[9].

After management of mushroom growth, the spectrophotometer method has been applied to the determination content of heavy metal of Pb, Cd, and As in the fruiting body.

2.2.2 Detection method

The content of Pb, Cd, and As were determined by the methods of national standard.

2.2.3 Data-processing

Enrichment coefficient were calculated to analyze the content of Pb, Cd, and As enrichment trend at the fruiting body of two kinds of mushrooms P-5 and P-8. Application of Non-linear Regression Analysis was used for comparing the content of Pb, Cd, and As between cultivating material and the fruiting body. According to the concentration standard of the dried products of mushrooms [the Arsenic content $\leqslant$1.00 mg • kg^{-1}; the lead content$\leqslant$ 2.00 mg • kg^{-1};the Cadmium content$\leqslant$1.50 mg •kg^{-1}], and Calculated the safety limit value of three heave metals in cultivating material[10].

3. RESULT AND ANALYSIS

3.1 The Enrichment of Cottonseed Shell Cultivation Materials Pb in Two Kinds of Mushroom

Table 1 Two kinds of mushroom on the enrichment of cottonseed shell cultivation materials Pb

Pb concentration（mg • kg-1）	Lead content in cultivation materials（mg • kg-1）	Lead content in sub entities（mg·kg^{-1}）		Enrichment factor	
		P-5	P-8	P-5	P-8
0	0.22±0.030	0.10±0.000	0.27±0.030	0.432a	1.213b
2	1.72±0.040	0.31±0.004	0.18±0.030	0.178	0.106
7	6.78±0.120	0.41±0.006	0.19±0.005	0.028	0.044
15	13.36±0.310	0.17±0.013	0.04±0.004	0.013	0.003
30	19.37±0.480	0.23±0.010	0.12±0.000	0.012	0.006
60	43.46±1.320	0.91±0.020	1.08±0.010	0.021	0.025

Note: the results of the above table show that the average of the measured 9 times of the data is deviation, and the difference between the different letters of the same line after the enrichment factor is significant, the same as.

Table 2 Two kinds of mushroom on enrichment of corn cob cultivation materials Pb

Pb concentration（mg • kg-1）	Lead content in cultivation materials（mg • kg-1）	Lead content in sub entities（mg·kg^{-1}）		Enrichment factor	
		P-5	P-8	P-5	P-8
0	0.32±0.030	0.18±0.000	0.23±0.000	0.563	0.719
2	3.22±0.070	0.25±0.001	0.19±0.007	0.078	0.059
7	7.68±0.100	0.38±0.030	0.21±0.010	0.050	0.027
15	14.49±0.280	0.57±0.050	0.22±0.010	0.039	0.015
30	46.40±4.245	1.11± 0.010	0.53±0.016	0.024	0.013
60	60.97±0.050	0.85±0.050	1.01±0.007	0.014	0.017

Table 3 Two kinds of mushroom on three kinds of heavy metals absorption and accumulation regression equation and safety limit values

Heavy metal	Cultivation material	Mushroom varieties	Regression equation and correlation		Safety limited (mg·kg^{-1})
Pb	Cottonseed hull	P-5	$y=0.0008x^2-0.0257x+0.4176$	$R^2=0.932$	63.34
		P-8	$y=0.0011x^2-0.0290x+0.2687$	$R^2=0.990$	55.09
	Corn cob	P-5	$y=-0.0005x^2+0.0425x+0.1148$	$R^2=0.978$	
		P-8	$y=-0.0004x^2-0.0093x+0.2428$	$R^2=0.991$	
Cd	Cottonseed hull	P-5	$y=-0.5343x^2+5.2732x+0.0061$	$R^2=0.995$	0.29
		P-8	$y=-0.4367x^2+3.9306x-0.0431$	$R^2=0.985$	0.41
	Corn cob	P-5	$y=-0.4623x^2+5.0694x+0.6823$	$R^2=0.977$	0.16
		P-8	$y=-0.2652x^2+3.2780x+0.2142$	$R^2=0.977$	0.40
As	Cottonseed hull	P-5	$y=-0.0170x^2+0.3499x+0.1346$	$R^2=0.981$	3.16
		P-8	$y=-0.0244x^2+0.6273x+0.1052$	$R^2=0.988$	1.51

P-5 and P-8 mushroom for enrichment pattern in cottonseed hull Cultivation material Shown in table 1. This result indicated the average of the bioconcentration coefficient of Pd in 2 mushrooms were 0.114 and 0.233, and the bioconcentration coefficient was low. As can be seen from table 3(x was the content of Pb in cultivation, y was the content of Pb in the fruiting food), when y = 2.00 mg • kg^{-1}, which could be calculated by the safe limit value of Pb was 66.34 mg • kg^{-1}, 55.09 mg • kg^{-1} in the cottonseed hull cultivation material and corncob cultivation material through the regression equation.

P-5 and P-8 mushroom for enrichment pattern in cottonseed hull Cultivation material Shown in table 2. This result indicated the average of the bioconcentration coefficient of Pd in 2 mushrooms were 0.128 and 0.142, and the bioconcentration coefficient was low also. Base on table 3, when y=2.00 mg·kg^{-1}, equation had no solution which showed that

There was no Correlation between the bioconcentration coefficient of two mushrooms in corncob cultivation material and the Pb concentration in the cultivation material, therefor which could not obtain the safe limit value of Pb. Through significant analysis about the enrichment factor of two mushrooms in corncob cultivation material, the result was not significant for enrichment capacity above every of additive concentration of Pb.

As can be seen from table 1 and 2, when the content of Pb of the experiment setup was between 0.00~60 mg·kg^{-1}, the highest value of the content of Pb in the fruiting body was only 1.11 mg·kg^{-1}. According to food safety standards, it was not exceeding the safety value.

3.2 Enrichment of Cottonseed Shell Cultivation Materials Cd in Two Kinds of Mushroom

Table 4 Two kinds of mushroom on enrichment of cottonseed shell cultivation materials Cd

Cd concentration (mg·kg^{-1})	Cadmium content in cultivation materials (mg·kg^{-1})	Cadmium content in fruiting bodies (mg·kg^{-1})		Enrichment factor	
		P-5	P-8	P-5	P-8
0	0.06±0.007	0.19±0.000	0.17±0.006	3.124	2.822
0.1	0.19±0.001	1.19±0.010	0.73±0.020	6.243a	3.859b
0.5	0.81±0.012	3.66±0.020	2.61±0.025	4.523a	3.226b
1	1.98±0.025	8.92±0.065	6.72±0.050	4.505a	3.394b
2	2.74±0.020	10.05±0.045	6.95±0.090	3.668a	2.536b
5	6.42±0.115	11.86±0.190	7.22±0.006	1.847a	1.124b

Table 5 Two kinds of mushroom on enrichment of corn cob cultivation materials Cd

Cd concentration	Cadmium content in cultivation	Cadmium content in fruiting bodies (mg·kg^{-1})	Enrichment factor

（mg·kg-1）	materials （mg·kg-1）	P-5	P-8	P-5	P-8
0	0.06±0.011	0.30±0.001	0.29±0.010	4.924	4.820
0.1	0.18±0.011	1.20±0.010	0.86±0.015	6.667a	4.759b
0.5	0.61±0.030	4.65±0.012	1.60±0.020	7.623a	2.626b
1	1.28±0.020	7.15±0.115	5.03±0.030	5.586a	3.927b
2	2.44±0.120	9.52±0.120	6.12±0.010	3.902a	2.508b
5	7.12±0.365	13.40±0.170	10.14±0.050	1.882a	1.424b

P-5 and P-8 mushroom for enrichment pattern in cottonseed hull Cultivation material Shown in table 4. This result indicated the average of the bioconcentration coefficient of Pd in 2 mushrooms were 3.985 and 2.827, and the bioconcentration coefficient was higher. As can be seen from table 3(x was the content of Cd in cultivation, y was the content of Cd in the fruiting food), when y=1.50 mg·kg^{-1} and R^2 was greater than 0.98, the safety values of Cd of two mushrooms in cottonseed hull cultivation material were 0.29 mg • kg^{-1} and 0.41 mg • kg^{-1}.

P-5 and P-8 mushroom for enrichment pattern in corn cob Cultivation material Shown in table 5. This result indicated the average of the bioconcentration coefficient of Pd in 2 mushrooms were 5.097 and 3.344, and the bioconcentration coefficient was very high. Base on table 5, when y=1.50 mg·kg^{-1}and R2 was over than 0.97, the safety value were 0.16 mg •kg^{-1} and 0.40 mg •kg^{-1}, and the enrichment factor was highest, being 7.623; when the content of Cd was 0.5 mg·kg-1, the content of Cd in cottonseed hull Cultivation material and corn cob cultivation material were all higher than the safety value. This result indicated the enrichment capacity of Cd for P-5 was more than P-8 no matter what it was in corncob cultivation material or cottonseed hull Cultivation material.

3.3 Enrichment of Cottonseed Shell Cultivation Materials As in Two Kinds of Mushroom

Table 6 Two kinds of mushroom cultivation in cottonseed hull material for the enrichment of As

As concentration （mg·kg^{-1}）	Arsenic content in cultivation materials （mg·kg^{-1}）	Arsenic content in sub entities （mg·kg^{-1}）		Enrichment factor	
		P-5	P-8	P-5	P-8
0.00	0.05±0.003	0.02±0.005	0.02±0.006	0.401	0.425
0.10	0.07±0.005	0.07±0.004	0.08±0.010	1.000a	1.143b
0.50	0.64±0.006	0.46±0.006	0.54±0.004	0.723a	0.838b
1.00	1.03±0.016	0.64±0.018	0.92±0.012	0.620a	0.890b
2.00	1.46±0.035	0.62±0.019	1.12±0.020	0.425a	0.767b
4.00	4.72±0.030	1.31±0.024	2.28±0.065	0.278a	0.483b
6.00	5.42±0.024	1.60±0.024	2.68±0.070	0.295a	0.494b
8.00	7.93±0.068	1.78±0.030	3.80±0.120	0.224a	0.479b
10.00	11.06±0.035	1.96±0.045	3.99±0.125	0.177a	0.361b

P-5 and P-8 mushroom for enrichment pattern in cottonseed hull Cultivation material Shown in table 6. This result indicated the average of the bioconcentration coefficient of As in 2 mushrooms were 0.460 and 0.653, and the bioconcentration coefficient was between Pb and Cd. the result was not significant for enrichment capacity above every of additive concentration of Pb. This result indicated the enrichment capacity of Cd for P-5 was more than P-8 no matter what it was in corncob cultivation material or cottonseed hull Cultivation material. When y=1.00 mg·kg-1, the safety values were 3.16 mg·kg^{-1} and 1.51 mg·kg^{-1}, the content of As in cottonseed hull Cultivation material were all higher than the safety value.

4. CONCLUSION

This paper wans study on different varieties of mushrooms on law about the absorption or

enrichment of three kinds of heavy metals and the safety limit value of heavy metals in the cultivational materials, We use two kinds of mushrooms in two mediums to do cultivational experiments through adding different concentrations of lead, cadmium chloride and nitrate arsenic trioxide., and next, gather the sporocarps. Then we respectively detect the contents of mushrooms' sporocarps, and Pb, Cd, As in the cultivational materials before bagging, and use the SPSS software to an analysis in the correlation between the obtained data. Results show that : The two mushrooms on the law about three kinds of heavy metal enrichment or absorption capacity is: Cd>As>Pb; Totally about ten regression equations are obtained; The values of R2 are above 0.9, We fingered out eight Pb values by using these two mushrooms which are cultivated in the cotton seed shells or the corn cobs. The critical value of Pb are respectively 63.34,55.09 mg·kg-1;The critical value of Cd are 0.29, 0.41, 0.16, 0.40 mg·kg-1;The critical value of As are respectively 3.16,1.51 mg·kg-1.To conclude, different cultivational materials cultivate the same mushroom, or the same kind of cultivational materials culture different varieties of mushrooms .There are different laws between them.

REFERENCES

[1]Edible and medicinal mushroom. 2013, 21(3): 156-157.

[2]Benazir J F, Sugantlu R, Rajvel ed al. Bioremediation of cluomium in tannery effluent by microbial consortia. African Journal of Biotecluology, 2010, 9(21): 3140-3143.

[3]Yu De-yang, Cheng Xian-hao, Luo Yi, etal. Research progress on accumulation of heavy metal in macro-fungi. Edible Fungi of China, 2011, 30(1): 10-13.

[4]Zhang Yujie, Hu Guohai, LI Hong-chao. Analysis and assessment of heavy metal pollution in fresh edible meshroom collected from several aereas in Yunnan Province. Northern Horticulture, 2011(20): 171-174.

[5]GB/ T 5009. 12 2010. The Determination of Pb in Food.

[6]GB/ T 5009. 15 2014. The Determination of Cd in Food.

[7]GB/ T 5009. 11 2003. The Determination of As in Food.

[8]Ministry of Agriculture of the People′s Republic of China. GB 7096-2003 Hygienic standard for edible fungi. Beijing: China Agriculture Press, 2003.

[9]Ministry of Agriculture of the People′s Republic of China. NY 749—2012 Green food: Edible mushroom. Beijing: China Agriculture Press, 2012.

[10]Lin Yankui, Wang Bingtao, Yan Zhi, et al. Total arsenic and arsenic species analysis in edible fungus. Food Science and Technology, 2012, 37(5): 295-299.

Automotive instrument housing injection molding process and mold design

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Abstract: China's industrial construction has developed rapidly with the rapid development of China's overall economic construction, contributing to China's economic construction. The effective application of high-speed and powerful grinding technology can provide complete support for the optimization of the comprehensive quality of machining. Therefore, under the current rapid innovation of machining technology, the optimized use of high-speed and powerful grinding technology has become a key concern of people from all walks of life.

Keywords: High speed and powerful grinding; Machining; Development and application

1. INTRODUCTION

With the rapid development of China's overall economic construction, many industries in China have ushered in new development opportunities and development space [1]. In the process of development, mechanical processing enterprises face more competition. In order to improve competitiveness, the management personnel of the enterprise need to formulate an efficient production mode. It is necessary to optimize the production process of machining and high-speed and powerful grinding technology [2]. An advanced technology, which has high working efficiency, can guarantee the quality of grinding, and can also guarantee the grinding speed. The application of this technology can improve the production efficiency [3].

2. HIGH SPEED GRINDING IN MACHINING APPLICATIONS

The technical characteristics of high-speed grinding, the efficiency advantage of high-speed grinding is much higher than that of conventional grinding. However, if the machining technology is simply improved by the grinding speed, it is difficult to effectively adapt to the high-speed grinding technology. Application requirements. In addition, in the process of work-piece machining, the application of high-speed grinding technology can ensure the reasonable control of the protrusion of the work–piece [4]. Therefore, the use of high-speed grinding technology can play a certain role in controlling the surface roughness of the work-piece. In addition, the application of high-speed grinding technology can directly control the life of the grinding wheel, and ensure that the overall grinding rate of the work-piece is optimized, so that the processing accuracy is more reasonable and complete control.

The high speed grinding in machining application is shown in figure 1.

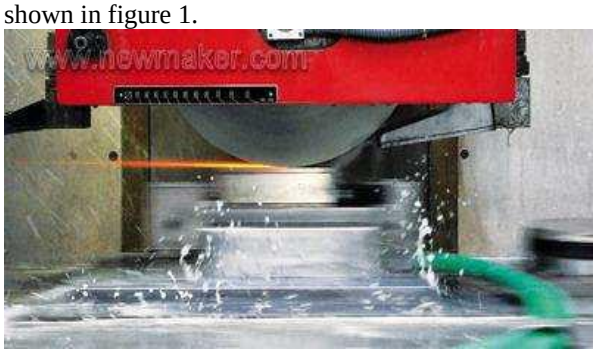

Figure 1 The high speed grinding in machining application

The application of high-speed grinding technology, from the current application of high-speed grinding technology, the type of high-speed grinding machine is in the process of continuous innovation and development. Internal grinders, surface grinders and cam grinders have provided favorable technical support for the machining of workpieces. From the current market environment in the world, countries with developed industrial grades pay more attention to the application of high-speed grinding technology. High-speed grinding of 45~60 m/s is currently widely used in many countries with developed industrial capabilities. The high-speed grinding of 80~150m/s is lower than that of 45~60 m/s high-speed grinding, but it can still exert a favorable influence on the application of high-speed grinding technology. At present, in the process of setting high-speed grinding technology in China, the production grinding speed is generally controlled at 50~80 m/s, and the application of concave grinding machine and bearing grinding machine is also extensive. From the perspective of the popularity of high-speed grinding technology in the world, the bearing industry and the engine industry have adopted high-speed grinding technology extensively. In the process of crankshaft production of automobiles, the application of grinding crankshaft has also been widely used. Recognition. Therefore, the emphasis on high-speed grinding technology for multiple grinding wheels and the application of high-speed grinding technology by controlling the number of grinding wheel devices can make a great progress in controlling the efficiency of grinding technology.

3. STRONG GRINDING

Strong grinding means that in the process of grinding, the strength is relatively large, the depth of grinding is also relatively large, and it has a wide range of applications in metal processing, which can cut materials with relatively large hardness. This technology is applied and popularized. In the process, you must increase the amount of feed. This technology can be used for turning and milling. Due to the large grinding force, the technician must ensure the precision of grinding, optimize the process and improve the manufacturing process. In the case of strong grinding, the staff needs to do both roughing and fine machining. In the process of application, it is necessary to improve the efficiency of the work, reduce the input of the equipment, control the cost of production and processing, and apply the powerful grinding technology. The processing efficiency of the workpiece is improved, the equipment investment is reduced, the process is saved, and the auxiliary working time of each process is saved, and the strong grinding fluid does not receive the influence of the surface condition of the material and the hardness of the material itself. At present, strong grinding at home and abroad has been applied to grinding machines such as flat grinding and external grinding. More powerful grinding is used for the flat spindle and the grinding machine. The cutting-in external cylindrical grinding machine and the end-to-round grinding machine have a power of 73.5-110.3 kW; the maximum power of the spindle is only 220.5 kW, and the machine with 730 kW may be produced, the productivity is 500-600cm/min, and the metal removal rate per small (270)-32) kg, the maximum depth of cut can reach 37mm. Strong grinding has also been widely used in the weapons industry. The M60A1 medium-sized tank body of the United States is equipped with 12 torsion bases on both sides of the car body, but it is poured with the bottom of the car body. It is difficult to process with general cutting methods. It is difficult to process with powerful grinding. It is a two-in-one Merairg. The powerful grinding machine is processed on both sides at the same time, the residual amount is 6.35 mm, the power of each grinding machine is 110.25 kW, and the multi-stage grinding wheel with a diameter of 762 mm and a thickness of 203 mm is used.

4. HIGH-SPEED POWERFUL GRINDING IN MACHINING APPLICATIONS

4.1 Technical Characteristics of High Speed and Powerful Grinding

High-speed and powerful grinding technology in the application process, the application range of grinding technology is generally wide. The outer circumference and the plane of the workpiece can be directly processed using high-speed and powerful grinding. In the process of selecting and applying the high-speed and powerful grinding method, the design method of the grinding technology is applied according to the shape characteristics of the workpiece, which can provide support for the cutting-type grinding method to fully meet the needs of the part processing. From the existing application of the parts, the cylindrical parts are most suitable for the practical application of high-speed and powerful grinding technology. The specific technical application methods will also be adjusted according to the shape characteristics of the parts to adapt to the high-speed and powerful grinding technology. Practical application needs. High-speed and powerful grinding technology has strong basic technical integration capabilities. Simple grinding and turning processes can be innovatively integrated and operated in a single process. In the process of high-speed and powerful grinding technology, the machining allowance of the workpiece can be more effectively controlled, and the roughness of the surface of the workpiece will be properly controlled. When the precision of the workpiece is optimized, high-speed and powerful grinding is possible. The role will be more complete.

4.2 High-Speed and Powerful Grinding Problems and Solutions

As the grinding speed is increased, the function is increased, and the vibration is increased, the heat is increased, and the like, and the following measures can often be used to solve the problem. (1). The side of the grinding wheel is mainly to increase the strength. 1) using fine-grained abrasives; 2). Using bonding agents with strong bonding properties, such as boron-doped ceramic binders, boron glass binders, etc.; 3). Using center-hole localized grinding wheels or changing wheel structure, such as center-free grinding wheels and sand tiles Combination grinding wheel. Lili-boron nitride grinding wheel has been applied. The grinding wheel is mostly trimmed with diamond rollers. (2). The side of the machine tool is mainly to strengthen the rigidity. It adopts hydrostatic bearing, hydrostatic guide rail, improved spindle and bed rigidity, and adopts grinding wheel balance and automatic balancing device. (3). Cooling side. In order to pulverize the airflow, a special cooling nozzle is used to segregate the airflow; high pressure cooling is used to increase the coolant flow rate and capacity. Study the new component oil to cool or add additives to the liquid to improve the cooling effect. (4). The safety protection side is generally thickened by the thickness of the grinding wheel cover. The semi-closed or fully enclosed cover is used. The cover is filled with plastic, rubber gasket, and the automatic closing of the grinding wheel cover is adopted.

4.3 Application of High Speed and Powerful Grinding Technology

The high-speed and powerful grinding technology runs at a faster speed and its functions are also very rich. During the specific operation, there is a possibility that the mechanical device will intensify the vibration problem, and the overall heat of the

mechanical equipment will continue to rise. Therefore, at high speed In the process of designing the application technology of strong grinding technology, the attention and management of the application details of the parts can be strengthened, which can provide higher quality guarantee for the optimized use of high-speed and powerful grinding technology, and the specific operation application of high-speed and powerful grinding technology. Can be optimized based on the integration of multi-function devices. In the process of formulating specific high-speed and powerful grinding technology application methods, the application value of the grinding wheel device is the most obvious. Therefore, it is necessary to design the specific application scheme of high-speed and powerful grinding technology from the application materials of the grinding wheel. The choice of abrasive needs to maintain sufficient fineness, and the bonding agent also needs to be selected according to the practical application requirements of high-speed and powerful grinding technology, and the period has strong combination.

5. CONCLUSION

High-speed and powerful grinding is an advanced technology that can guarantee the speed of grinding and the strength of grinding. It is a new type of processing technology and has a good application prospect in the machining industry. In the process of application and development, it is constantly improving, and the scope of application is constantly expanding. High-speed and powerful grinding can guarantee the precision of machining. In order to ensure the application effect, the staff should also constantly improve this technology in practice, which also helps to promote the development of the machining industry.

REFERENCES

[1]Zhou Zhenxin. High-speed cylindrical grinding simulation and engineering experiment of difficult-to-machine materials. Shanghai: Donghua University, 2010.

[2]Yi Guangbin, Yan Daomei. On the application and development of high-speed and powerful grinding in mechanical processing. Heilongjiang Science and Technology Information, 2009(06): 31.

[3]Pang Zirui. Experimental study on the performance of ultra-high-speed point grinding ceramic CBN grinding wheel. Boston : Northeastern University, 2009.

[4]Lin Yongliang. Design and experimental study of physical simulation platform for single abrasive grinding. Beijing: Jiaotong University, 2015.

Autonomous vision-based machine-learning method for construction process monitoring

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Abstract: The project is to combine Neural Network and Building Information Modeling, BIM, to develop an autonomous construction management system, which enables automatically process tracking and safety monitoring. It is illustrated the first stage of the project in the article. The author introduces the research method and theoretical basis in the article. BIM modeling technologies and artificial intelligence algorithms are mentioned. Also, applications in construction industry is also discussed.
Keywords: Image recognition; BIM; Artificial Intelligence; Point-cloud modeling

1. INTRODUCTION

On-site cameras has been widely used in construction industry in the past decades. In addition, building information modeling (BIM) and schedules with production-level details also create opportunities for automatically construction process monitoring. The goal of the project is to design a single machine learning model that can jointly reason about geometry and appearance of observed BIM elements in site images and videos to monitor and report on their state of progress. The report contains three part related work study, current research method and conclusion.

Work on process tracking, model reconstruction and machine-learning for construction management are illustrated. This part makes a statement of previous work that contribute to automated progress tracking method. Scheduling and cost analysis are integrated with 4D BIM and machine learning. Algorithm comparison is also covered to determine which algorithm can meet requirements of real-time analysis.

In the part of research method illustration, data processing is introduced in the article. This part introduced work of image labeling and how it connects with further work [1].

2. RELATED WORK

Previous research is studied for reference. Work related to process monitoring, 3D reconstruction, object detection for progress and object detection for safety are applied in this study.

3. RESEARCH METHOD

Current stage contains two parts of work: data labeling and model training. Data labeling is finished manually using matlab image labeler toolbox. Images, taken by smart phones and drones are used. Labels include two types: occupied and non-occupied. Occupied objects are those that are also presented in BIM models while non-occupied objects are those that are invisible or not presented in BIM models. Labeled images will be used as input for model training. Labels not only show existence in BIM model but also distinguish different materials and equipment. For instance, non-crane represents cranes. Detection of cranes can determine which stage the construction is by comparing with 4D BIM [2].

In addition, detail level is also considered during image labeling process. For instance, images used for guardrail detection model are labeled by pixel for higher accuracy [3].

4. RESEARCH ASPECTS

(1) Construction Management Based on BIM Technology

As is mentioned in the paper written by Lin (2017), construction process monitoring is currently conducted manually3. The method requires a large amount of work which causes extra expense. In addition, it relies on on-site individuals' standards, which leads to a result that the evaluation is not stable. However, researchers promoted methods that allows automatically cost tracking and process tracking [4-5].

The fluctuation of economic variables and indexes (EV&Is) causes changes of construction costs, which increase the difficulty of decision making and value engineering for construction project.7 Thus, a more accurate and efficient method for financial assessment is required. Therefore, machine learning is introduced to predict the influence of 20 factors mentioned in the article that will insert influence on construction financial conditions. The author addressed an advanced concept of machine-learning and compare accuracy one efficiency of algorithms including DBM, DBM-SoftMax, DBM-BPNN, and DBM-SVM. A trained model for cost prediction is promoted [6].

Lin uses time-lapse image collections taken by consumer-grade smartphone cameras [3]. The study makes a clear statement of current problems in construction process monitoring and necessarily of automatically process tracking method investment.

According to the research, there is no doubt that 4D and 5D BIM is the key to achieve life-cycle assessment for its integration of construction work, scheduling and cost analysis. However, more images are supposed to used for validations. In addition, interior work can not be monitored using the method came up by Lin [3]. As-built model and 4D BIM is compared for current construction completion in Lin's paper.

As is mentioned above, as-built model should be generated. Traditional method for model reconstruction is using laser scanner to generate point cloud model. However, laser scanning has limitations especially when considering expense of equipment. Also, on-site cameras are widely used. Therefore, Structure from Motion (SfM) is promoted. SfM is a method that allows model generated with visual-based data such as pictures or video taken by on-site cameras.

Study [4] illustrates details related to model reconstruction4. The paper also listed current limitations. First of all, algorithm for cloud point reconstruction is not efficient enough. In addition, consumer-level cameras are widely used on construction site but not be able to use for analysis for its resolution limitation. Also, accuracy needed to be improved. And 4D BIM technologies should be applied more during construction work. Images taken from different positions are used to generate 3D point cloud model by coordinates transformation in a Euclidean space, which also enable next step of machine-learning. Then, occupation of each block will be labeled as occupied and empty. The research shows a possible method to label and analyze current construction conditions. However, the method can only detect the boundary and occupation. For exact activities, the analysis is no longer available. For instance, the model can detect the existence of objects but not able to determine whether it is rebar or concrete work. Thus, the accuracy can not meet requirements. And material detection remains as future work according to the article.

(2) Image Recognition for Construction Management

Algorithm is the foundation of accurate and efficient automated model. The following are several most frequently used algorithms. For image recognition, CNN, convolutional neural network, is the most frequently used algorithm. But CNN can not meet requirements for real-time monitoring. Thus, more efficient algorithms such as Fast RCNN and Faster RCNN are promoted.

CNN is short for Convolutional neural network. Images input will be processed through Convolutional layer, pooling layer and fully connected layer. Input will be flatten and feed into a fully connected layer. As for dimensionally size reduction, pooling layer is performed.

RCNN performs a selective search method. Several initial sub-segmentations are generated for candidate regions. Then use greedy algorithm to recursively combine similar regions into larger ones. The RCNN is more efficient than cnn for its search algorithm. However, it is a fixed algorithm, which means no learning during the process and lead to bad candidate proposals. In addition, there are still a large amount of regions to be processed for each image which is not efficient enough. The following Figure 1 shows RCNN. Instead of feeding all the regions to the Convolutional neural network every time, fast RCNN finish the step only once and a feature map is generated from it. A separate network is used for candidates proposal in faster RCNN for higher efficiency. According to the study related to autonomous structural damage recognition3 [2], different algorithms are used to compare accuracy and efficiency in order to obtain a method that is able to automatically recognize 5 different types of structural. Accuracy of RCNN, fast RCNN and faster RCNN are 94.7%, 91.8%, 86.1%, 90.9%. However, faster RCNN takes the shortest time than RCNN and fast RCNN.

In this project, MaskRCNN will be applied, which achieves both image classification and instance segmentation. The architecture is shown belowFig1.

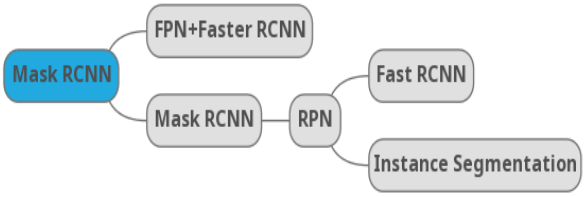

Fig1. The architecture of project

5. APPLICATION

(1) Object detection for progress

Material detection relies on machine-learning. Images or videos are used as input to train the model for object detection.

Researchers build up a database CML, construction material library, for material recognition. First of all, reconstruct a point-cloud model. Then, sample squared-shaped patches. Next, select a single material with the highest frequency of appearance. Afterwards, use filters to train the model. Four datasets of incomplete and noisy point cloud models are assembled from construction site images and 4D BIMs in order to validate the method. However, construction sequencing are supposed to applied so that objects or activities that have been finished but not visible can be shown. In addition, BIM and CML need to be enhanced for higher efficiency and accuracy.

Research [5] shows that color based features retain a reasonable accuracy level even for highly compressed

images 5. The material classification method promoted by the author is also suitable for dynamic changes of illumination, viewpoint, camera resolution, and scale for unordered construction.

To train the model, the following steps are done. Firstly, codebooks of material appearances after being processed by filter collections are generated. Then, linear, chi-square, and radial basis functions are applied to train the model. For model testing codebook is used. Codebooks are generated with grey scale images considering influence of illumination. According to the result, the method can be applied for material recognition using large number of images.

(2) Object detection for safety

Construction safety is one of the problems considered by all parties during construction. As is mentioned in the article written by Tang [6], "Rate of fatalities in the private construction industry has reached 937, a 4% increase from 2014 (BLS 2016)". Not only workers but also public surrounding and users will be influenced if hazards occur. Tang [6] promoted a method for automatically hazard recognition applying machine learning to reduce hazards. A lot of researches has been done including BIM, CNN algorithm, NLP model and studies related to equipment detection, which form a solid foundation for Tang's work [6]. Building information modeling, known as BIM, helps with reduction of hazards caused by design. In addition, safety report can be generated when integrating automatic hazard recognition system with 3D or 4D model (even higher). The idea of applying machine learning for construction projects has been researched by researchers. However, the accuracy and functions are limited by small database and less efficient algorithm. With more researches related to situation recognition done, it enabled a more accurate and efficient for larger scale analysis such as construction site.

As is mentioned in Tang's article in 2017, Visual safety checking can be summarized as the following four steps

1). Train a model using collections of rules and get parameters

2). Visual model predicts the most likely activity set v

3). Check if v* and v is the same activity set

4). Get a binary return value using xnor gate

Tang [6] promotes a new method for automatically hazard identification, however, more information is expected to be provided. Especially more explanations of input and output. For instance, how to transfer safety rules and images to the same types of data to compare. In addition, how to promote efficiency to suit large scale of data set is also supposed to be mentioned in the article.

6. CONCLUSION

Research of the semester is the first stage of the whole process. Work of the current stage is mainly related to previous studies and research method determination. Following aspects is mentioned in the paper.

(1). Important technology foundation including SfM and BIM.

(2). Algorithms for image recognition. Algorithms for image recognition are compared. It shows that faster RCNN is the most efficient algorithm to achieve real-time analysis.

(3). Other applications including safety management and cost analysis. Data processing and image labeling has been finished. There remains programming and validations to be done as future work. Mask RCNN released by Facebook AI team is being studied as a sample.

Future research will focus on implementation and model training. In addition, it is designed to compare autonomous system and traditional methods on construction sites. Also, real-time monitoring will be achieved.

REFERENCES

[1]Han K. K, Golparvar-Fard M. Appearance-based material classification for monitoring of operation-level construction progress using 4D BIM and site photologs. Automation in Construction, 2015(53): 44–57.

[2]Cha Y-J, Choi W, Suh G, et al. Autonomous structural visual inspection using region-based deep learning for detecting multiple damage types. Computer-Aided Civil and Infrastructure Engineering, 2017, 33(9): 731–747.

[3]Lin J J, Golparvar-Fard M. Proactive construction project controls via predictive visual data analytics. Computing in Civil Engineering, 2017.

[4]Golparvar-Fard M, Peña-Mora F, Savarese S. Automated progress monitoring using unordered daily construction photographs and IFC-based building information models. Journal of Computing in Civil Engineering, 2017, 29(1): 04014025.

[5]Dimitrov A, Golparvar-Fard M. Vision-based material recognition for automated monitoring of construction progress and generating building information modeling from unordered site image collections. Advanced Engineering Informatics, 2014, 28(1): 37–49.

[6]Tang, S, Golparvar-Fard M. Joint reasoning of visual and text data for safety hazard recognition. Computing in Civil Engineering, 2017.

[7]Rafiei M H, Adeli H. Novel machine-learning model for estimating construction costs considering economic variables and indexes. Journal of Construction Engineering and Management, 2018, 144(12): 04018106.

Design of improved genetic algorithm for task scheduling in cloud computing environment

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Abstract: In cloud environment, aiming at the task completion time and load balancing, the traditional genetic algorithm is improved, and an improved genetic algorithm for cloud task scheduling is proposed. According to the performance of virtual resources in cloud environment, this algorithm introduces the concept of relative fitness of virtual machine, improves the traditional genetic mutation operation to directional mutation operation, and speeds up the algorithm's solving speed.
Keywords: Cloud environment; Task scheduling; Improved genetic algorithm

1. DESCRIPTION OF CLOUD TASKS

T={t0, T1... Tn-1} represents the task set of cloud computing, where n is the number of cloud tasks. ti ={tId, tLong, tData, tCost, tTime, tProperty, tStatus} Represents the attributes of the first task, where tId denotes the ID of the task, tLong denotes the total length of the task, tData denotes the relevant data required for task processing, tCost denotes the expenditure expected to complete the task, tTime denotes the expected completion time of the task, and tProperty denotes the resource attributes desired by the task, mainly including the computing power, memory and bandwidth of the resource, which can be quantified. The QoS performance requirements of tasks. TStatus denotes the state of a task. When a user submits a task application, the task state is created, Ready when the condition is satisfied and the resource is allocated, Waiting when the resource is bound and waiting for the resource to be free, Executed when the resource is obtained, and Finish when the task is finished. The cloud system will dynamically monitor, update and transmit these information for each task[1-3].

2. DESCRIPTION OF VIRTUAL MACHINE RESOURCES

V={v0, V1... Vm-1} represents the set of virtual machines provided by the cloud platform for the corresponding task set, also known as the virtual resource set, where m is the number of virtual machines. Vi={id, mips, ram, bw, price} represents the performance of the first virtual machine, where id represents the serial number of the virtual machine, MIPS represents the computing power of the virtual machine, ram represents the memory of the virtual machine, BW represents the bandwidth of the virtual machine, price represents the price of the virtual machine. Tasks on the same virtual machine are processed according to the principle of first come, first executed. After all tasks in the task set are executed, the cloud platform retrieves the corresponding virtual machines in the virtual resource set for the next scheduling. Virtual machine is an important guarantee for cloud tasks to be completed smoothly. It has a special management module to monitor, count and manage it dynamically to ensure the rational use of resources.

3. DESIGN OF IMPROVED GENETIC ALGORITHMS FOR CLOUD TASK SCHEDULING

Genetic algorithm optimizes cloud computing task scheduling problem by selection, crossover and mutation operation, which has high efficiency in early search, but its local search ability is poor, and the search speed of feasible solution is very slow in later search. This chapter mainly improves the mutation in genetic operation, speeds up the search speed of the algorithm, and finally finds the optimal solution[4-6].

3.1 Encoding Rules

In this paper, the traditional 0 and 1 encoding methods of genetic algorithm are changed to real number direct coding. The number of genes per chromosome depends on the number of tasks in the task set, and each gene value represents the serial number of the virtual machine. There are several individuals in the population, each of which represents a resource allocation scheme of the task set. For example, suppose that the number of virtual machines is 4, and the number of tasks is 8, then the number of individuals is 8, and the gene value is one of the corresponding serial numbers of 4 virtual machines. If there are individuals coding for (2, 0, 3, 3, 1, 2, 2, 2), then decoded: the execution of the virtual machine on the kill number. Task 1,1 Virtual Machine performs tasks 4 and 7,2 Virtual Machine performs tasks 0,5 and 6,3 Virtual Machine performs tasks 2 and 3.

3.2 Fitness Function

After decoding an individual according to rules, a resource allocation scheme of task set can be obtained. The tasks of each virtual machine are different. Assuming that w tasks are assigned on the first J virtual machine, the time F (j) for the jth virtual machine to complete the tasks assigned to it is as follows:

$$F(j) = \sum_{i=1}^{w} L_i^j \quad (1)$$

Where L_i^j represents the time taken by the jth virtual machine to complete the task assigned to it.

Formula (1) shows that the total execution time TF of all tasks is:

$$\mathrm{TF} = Max_{j=0}^{m-1} F(j) \quad (2)$$

Where M represents the number of virtual machines.

The smaller the TF, the better the user"s evaluation. At the same time, for cloud service providers, load balancing of virtual machine resources is also very important. In this paper, according to the method mentioned in reference, the time F (j) for virtual machine J to complete all tasks assigned to it is used to represent its load. Then, the average load AL and load balancing standard deviation BL of virtual resource set are respectively:

$$\mathrm{AL} = {\sum_{j=0}^{m-1} F(j)}/{m} \quad (3)$$

$$\mathrm{BL} = \sqrt{{\sum_{j=0}^{m-1}(F(j) - AL)^2}/{m}} \quad (4)$$

Among them, F (j) can be calculated by formula (1); M represents the number of virtual machines. It can be seen that the ideal value of BL is 0, the smaller the BL, the closer the load of each virtual machine, the more reasonable the scheduling strategy, and the higher the resource utilization. Based on the above analysis, the fitness function can be obtained as follows:

$$\mathrm{Fintness} = {1}/{(1 + BL + TF)} \quad (5)$$

Therefore, the larger the fitness function, the individual is the better.

3.3 Roulette Selection Operation

Roulette selection operations can be as random as Russian roulette. The most obvious feature of this method is that the better the individual in the population, the easier it is to be selected, that is, the easier it is to enter the next generation population for subsequent iteration. The selection probability $\mathrm{P}S_i$ of individual I in a population has a certain relationship with its own merits and demerits, which can be calculated by the following formula.

$$\mathrm{P}S_i = \frac{Fitness_i}{\sum_{i=1}^{Q} Fitness} \quad (6)$$

the fitness value of individual i, which can be calculated by formula (5), and Q is the size of population.

3.4 Improved Mutation Operation

(1) Relative fitness of virtual machines

The adaptive mutation probability is designed, and the mutation operation is carried out by roulette selection according to the relative fitness of the defined virtual machine. There are M virtual machines available in the virtual resource pool, and their configurations (parameters) can not be exactly the same, and the execution speed of the virtual machine is the most important performance of its tasks.

There are M virtual machines available in the virtual resource pool, and their configurations (parameters) can not be exactly the same, and the execution speed of the virtual machine is the most important performance of its tasks.

Definition 1: The formula for calculating the relative fitness VRF^k of the k-th virtual machine is as follows.

$$VRF^k = {V_{mips}^k}/{TV_{mips}} \quad (7)$$

$$TV_{mips} = \sum_{j=0}^{m-1} V_{mips}^j \quad (8)$$

Among them, V_{mips}^k represents the execution speed of the k-th virtual machine in the virtual resource set, TV_{mips} MIPS represents the sum of the execution speed of all virtual machines in the virtual resource set, and M represents the total number of virtual machines.

Formula (7) shows that the faster a virtual machine executes, the greater its relative fitness, and the sum of relative fitness of all virtual machines equals 1.

(2) Modified mutation operation

If the mutation probability is large, the mutation operation can be regarded as a process of searching for a better solution at random for the local feasible solution. This makes the overall performance and global search ability of genetic algorithm deteriorate seriously at the beginning of iteration. If the mutation probability is too small, the local optimization ability and the group diversity advantage will be lost in the later iteration period of the algorithm. Therefore, the setting of mutation probability should be adapted to the iteration process according to the need. According to many experiments, mutateRate is: mutateRate = 0.35-0.29exp (0.001i),i is the number of iterations. At the beginning of the iteration, the value is 0.05, and tends to be 0.35 infinitely with the increase of i.

4. SIMULATION EXPERIMENT AND ANALYSIS

In this paper, CloudSim3.0, a cloud computing simulator, is used for simulation experiments. The Datacenter Broker class of CloudSim platform is extended with Java programming language in MyEclipse 10.7 software, and a new method is written. This paper extends the Datacenter Broker class of CloudSim platform with Java programming language under MyEclipse 10.7 software, writes a new methodbindCloudlets ToVmsIGA, and then calls this method to implement the simulation experiment of cloud task scheduling strategy defined by the algorithm in this chapter. The convergence speed of the cloud task scheduling simulation experiment in this paper is compared with the improved genetic algorithm IGA and GA, and the performance of the proposed algorithm IGA is verified.

4.1 Experimental Design

This experiment compares the convergence of IGA and GA in task completion time. Task set and virtual resource set are generated randomly by random generator. Task length is in [1000,6000] interval and virtual machine execution speed is in [100,500] interval. The population size of IGA is Q=80, the maximum number of iterations is 500, and the crossover probability is 0.75. The variation

probability of GA is 0.1, and the other parameters are consistent with IGA.

The experiment keeps the number of virtual machines unchanged and the number of tasks unchanged at 500. Each experiment records the optimization of IGA and GA in detail, and repeats 10 experiments to get the average value. The results show that the convergence of IGA and GA in task completion time increases with the number of iterations of the algorithm as shown in Figure 1.

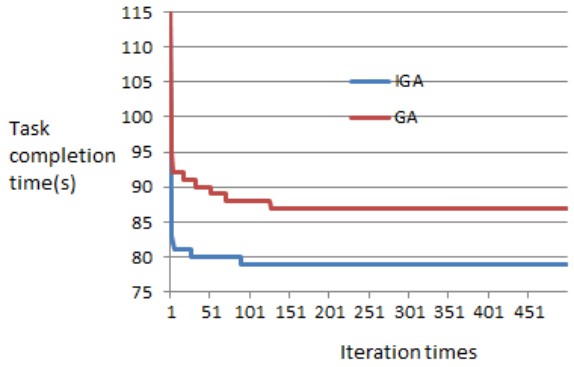

Figure 1 Comparison of convergence between IGA and GA

4.2 Result Analysis

The results shown in Figure 1 show that the IGA proposed in this chapter achieves convergence effect when iterating to about 100 times, while GA achieves final convergence only when iterating to about 250 times, which is faster than IGA. In addition, IGA converges to 81 on the convergence value of task completion time, while GA converges to 88, which reduces the convergence value by about 9%. It can be seen that the improved genetic algorithm (IGA) for cloud task scheduling proposed in this chapter achieves better and faster convergence effect than the improved genetic algorithm (GA).

5. CONCLUSIONS

Aiming at the problem of cloud task scheduling, an improved genetic algorithm is designed to balance the load of virtual machine and complete the task. By introducing the concept of relative fitness of virtual machines, the algorithm can optimize the results by making mutation operations develop directly in a better direction. By comparing IGA with GA and Min-Min, the simulation results show that the algorithm achieves some improvement.

REFERENCES

[1]Wang Qian, Zhou Shu Chen. Task allocation of cloud computing based on genetic algorithm. Journal of Chifeng University (NATURAL SCIENCE EDITION), 2013, 29(3): 25-27.

[2]Wang Guangbo, Ma Zitang, Sun Lei. Research on Load Balancing Oriented Distributed Virtual Machine Migration in Cloud Environment. Computer Applications and Software, 2013, 30(10): 87-91.

[3]Nie Qingbin, Cai Ting, Wang Ning. Application of improved ant colony algorithm in cloud computing resource scheduling. Computer engineering and design, 2016, 37(8): 2016-2020.

[4]Dai Bingrong, Kuang Zhiguang. Research on multi-dimensional constraint task scheduling based on Improved Genetic Algorithm in cloud computing environment. Minitype Microcomputer System, 2017, 38(9): 1945-1949.

[5]Li Qing, Li Yong, Tu Bibo, et al. Dynamic resource supply method of data center guaranteed by quality of service. Journal of Computer Science, 2014, 37(12): 2395-2407.

[6]Lin Ruo-nan, Task scheduling strategy and algorithms based on template in cloud computing environment. Computer Engineering and Application, 2016, 52(19): 48-52.

Design of PWM Lighting brightness Control based on LAN QIAO Cup single Chip Microcomputer

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Abstract: Using LAN QIAO cup single chip microcomputer IAP15F2K61S2 as controller, PWM is used to control the brightness of light. Press the button and cycle through four brightness modes of the indicator light, which are as follows: the completely out, 10% brightness, 50% brightness and 90% brightness. Dimming with PWM is widely used. The research of this paper has practical experience for the international electronic competition of Lan Qiao cup. It is the teaching practice with t the international electronic competition of Lan Qiao cup as the core.
Keywords: IAP15F2K61S2; PWM; Brightness control

1. INTRODUCTION

Subject competition is the most effective platform to improve students' innovative practical ability. It is important to take subject competition as the core and to promote teaching reform as subject competition [1-3]. Lan Qiao cup electronic competition includes single-chip microcomputer and embedded competition, which takes the actual enterprise engineering project as the competition topic to promote the training of professional and technical personnel in the field of software and information and enhance the employment competitiveness of college graduates. It has a very important promoting effect [4]. The research of this paper has practical educational experience for the national Lan Qiao cup single chip microcomputer electronic competition.

Pulse Width Modulation is commonly referred to as PWM, as pulse width modulation, abbreviated as pulse width modulation. Pulse width Modulation (PWM) is a digital coding method for analog signal level. The duty cycle modulation of square wave is used to encode the level of a specific analog signal. As long as the bandwidth is sufficient, any analog value can be encoded with PWM. PWM is used in many places, such as dimming lamps, motor speed regulation, sound making and so on. In this paper, PWM is used to realize light brightness controler on the comprehensive training platform of Lan Qiao cup[5-6]

2. REQUIREMENTS OF THE SYSTEM

On the comprehensive training platform of CT107D single chip microcomputer, the independent key S7 is used to control the brightness change of L1 indicator light by using PWM pulse width signal. The specific requirements are as follows:

(1) The frequency of PWM pulse width signal is 100Hz.

(2) The L1 indicator is off after the system is powered on.

(3) There are four brightness modes of L1 indicator, which are completely off, 10% brightness, 50% brightness and 90% brightness.

(4) Press the S7 button and cycle through the four luminance modes of the L1 indicator.

3. ANALYSIS OF SOFTWARE AND HARDWARE CIRCUITS

The LED circuit, keystroke circuit, buzzer circuit, 138 decoder and 74HC02 circuit of CT107D single-chip microcomputer training platform are included.

From the circuit analysis, it can be seen that if P2=0x80, P2 port is used as the output port, and the latch of the control lamp can be turned on. And the LED can be turned off by using the assignment statement P0=0xff. If P2=0xa0, P2 port is used as the output port, and the latch of the control buzzer can be opened. And the buzzer can be turned off by defining P0.6 port as buzz, assignment statement buzz=0.

If the frequency of PWM pulse width signal is 100Hz, the signal period is 1/100=0.01s=10ms. 10ms=10000us divided into 100 parts, then each one is 100us. So the timing time is 100 us. If the duty cycle is 60%, in the case of high level, 60 parts are high level, and 40 parts are low level. Each timing interrupt is 1 part. 100 parts is a cycle. Here 60 is duty cycle. Changing this value can change duty cycle, and pwm_duty is duty cycle in the program.

10ms C code delay program can use the "software delay calculator" to generate, as shown in figure 1.

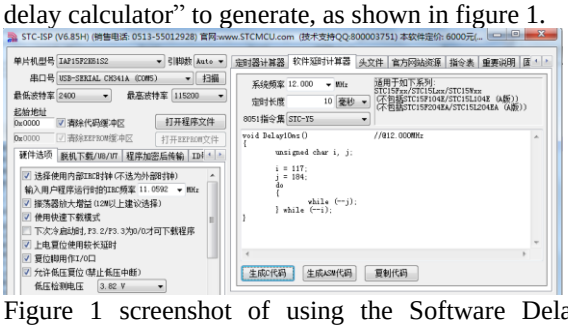


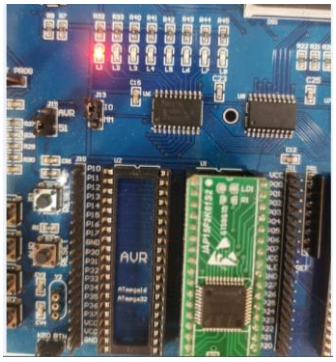
Figure 1 screenshot of using the Software Delay Calculator to generate 10ms C code delay program.

4. SOURCE PROGRAMMING

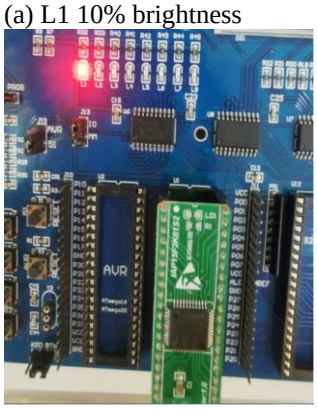
```
#include <STC15F2K60S2.H>
sbit L1=P0^0;
sbit S7=P3^0;
sbit buzz=P0^6;
unsigned char count=0,pwm_duty=0,state=0;

void initsys()
{
	P2=0xa0;
	buzz=0;
	P2=0x80;
	P0=0xff;
}

void initTimer0()
{
	TMOD=0x01;
	EA=1;
	ET0=1;
	TH0=(65536-100)/256;
	TL0=(65536-100)%256;
}

void time0() interrupt 1
{
	TH0=(65536-100)/256;
	TL0=(65536-100)%256;
	count++;
	if(count<pwm_duty)
	{
		L1=0;
	}
	else if(count==pwm_duty)
	{
		L1=1;
	}
	else	if(count==100)
	{
		count=0;
	}
}

void Delay10ms()		//@12.000MHz
{
	unsigned char i, j;

	i = 117;
	j = 184;
	do
	{
		while (--j);
	} while (--i);
}

void scankey()
{
	P3=0xff;
	if(S7==0)
	{
		Delay10ms();
		if(S7==0)
		{
			switch(state)
			{
				case 0:
					L1=0;
					TR0=1;
					pwm_duty=10;
//L1	10% brightness
state=1;
					break;
				case 1:
					pwm_duty=50;
// L1	50% brightness
					state=2;
					break;
				case 2:
					pwm_duty=90;
// L1	90%brightness
state=3;
					break;
				case 3:
					L1=1;			//L1
the completely out
					TR0=0;
					state=0;
					break;
			}
			while(S7==0);
		}
	}
}

void main()
{
	initsys();
	initTimer0();
	P2=0x80;
	L1=1;
	while(1)
	{
		scankey();
	}
}
```

5. RESULTS AND ANALYZED

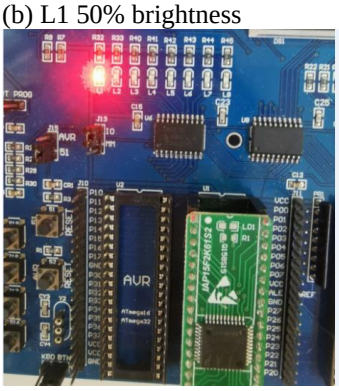
The program is writed by the programming software Keil C compiler. The hex file is generated. And the hex file is burned to the Lan Qiao cup single chip microcomputer IAP15F2K61S2. Press the button S7 and cycle through the four brightness modes of the L1 indicator, as shown in figure 2.



(a) L1 10% brightness



(b) L1 50% brightness



(c) L1 90% brightness

Fig 2 L 1 indicator light different brightness pattern physical diagram.

6. CONCLUSION

In this paper, Lan Qiao cup single chip microcomputer IAP15F2K61S2 is used as controller, and PWM is used to control the brightness of light. Press the button S7 and cycle through four luminance modes: complete off of L1 indicator, 10% brightness, 50% brightness and 90% brightness. The research of this paper has practical educational experience for t Lan Qiao cup single chip microcomputer electronic competition. It is the teaching practice with Lan Qiao cup single chip microcomputer electronic subject competition as the core.

REFERENCES

[1]Wang Li, Li Yangliang, Liu Liangwen. Research on the cultivation of college studentsundefined innovative and Entrepreneurship ability based on subject competition. Education and Teaching Forum, 2017, 23(6): 54-55.

[2]Zhang Junsheng, Jiang Yanqiu. Mass creation space-a new mode of innovation and entrepreneurship for college students. Research and practice of higher Education, 2016(3): 27-30.

[3]Yang Zhidong, Chen Xiaoqiao. Exploration and research on subject competition and innovative talent training model-taking electronic subject competition as an example. Laboratory Technology and Management, 2016(2): 14-16, 23.

[4]Zhu Xiaoqing, Liu Tieming, Zeng Yun. Practice of “promoting learning by competition” based on blue bridge cup. Computer Engineering and Science, 2016, 38(11): 46-49.

[5]Zhang Liping. Design of LED pattern lighting clock based on single. Chip Microcomputer. Journal of Chifeng University (Natural Science Edition), 2018, 34 (10): 10- 13.

[6]Liu Weidong, Zeng Shaojie, Li Chao, et al. This paper analyzes the design of digital clock and temperature display system based on single chip microcomputer. Shandong Industrial Technology, 2018, 268(14): 169.

Development and application of advanced surface technology

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Abstract: Nowadays, advanced surface technology is an interdisciplinary field and development frontier of material science, vacuum science and high technology. What's more, it has become one of the most important frontiers of modern high-tech field and advanced manufacturing industry. It is widely used in high-performance protective coatings and functional films. In this paper, the main contents and technical characteristics of hot dipping and thermal spraying technology in advanced surface technology are summarized, and their application prospects are also prospected.
Keywords: Advanced surface technology; Hot dipping technology; Thermal spraying technology

1. INTRODUCTION

Surface technology is a general term for surface treatment, surface coating and surface modification. Surface technology is to use various physical, chemical and mechanical processes to change the surface morphology, chemical composition, structure or stress state of the substrate and make it have some special properties.

Surface technology has been widely used in anticorrosion, wear resistance, repair, strengthening, decoration, etc. It can also be used in optical, electrical, magnetic, acoustic, thermal, chemical, biological and other applications. Surface technology involves not only metal materials, but also inorganic non-metallic materials, organic polymer materials and composite materials. For energy saving and material saving, it is suggested that the development of surface engineering be regarded as one of the most important measures and listed as a demonstration project. Some well-known experts at home and abroad predict that surface engineering will become one of the key technologies leading industrial development in the century. Surface engineering has a variety of technical methods, including electroplating, brush plating, electroless plating, coating, bonding, hot dipping, thermal spraying, chemical vapor deposition, surface heat treatment, surface laser modification, ion implantation and so on. In this paper, hot dipping and thermal spraying surface technology are mainly studied [1].

2. IMPORTANCE OF SURFACE TECHNOLOGY

The importance of surface technology lies in the following four points.

Firstly, generally, fatigue fracture, wear, corrosion, oxidation, burning and radiation damage of materials start from the surface. The damage and loss caused by this are also astonishing. According to the statistics of the World Tribological Society, friction has lost 1/3-1/2 of the primary energy. According to the relevant information, the loss of wear to industrial countries can reach 2%-8% of gross national product. About half of the steel used in Chinese machinery industry every year is consumed in the production of spare parts, but most of the spare parts fail because of the low wear life.

Secondly, with the rapid development of economy and science technology, people put forward higher and higher requirements for the ability of various products to withstand environmental effects and the reliability of long-term operation. In many cases, the performance and quality of components mainly depend on the surface performance. For example, due to the great improvement of surface technology, the surface composition and structure of materials can be strictly controlled, and high precision micro-processing can be carried out at the same time. So many electronic components can not only be made smaller and smaller, greatly reducing the volume and quality of products, but also improving the repeatability and quality of production.

Thirdly, the performance of many products mainly depends on the characteristics and state of the surface, while the surface is very thin. Therefore, surface technology can greatly saves materials, energy and resources.

Fourthly, applying surface technology, it is possible to produce various new materials and devices in a wide range of fields. At present, surface technology has played a key role in the preparation of new materials such as high critical temperature, superconducting film, diamond film, nano-coated film, nano-powder, nano-crystalline material, porous silicon, carbon-60 and so on. At the same time, it is also one of the most important foundations for the research and production of many optical, photoelectron, microelectronics, magnetism, quantum, thermal, acoustic, chemical, biological and other functional devices [2].

3. CLASSIFICATION OF SURFACE TECHNOLOGY

The development of surface technology mainly revolves two aspects: surface repair and surface

strengthening. Surface repair technology is mainly aimed at the surface treatment of the parts that have failed, in order to restoring their surface properties and prolong their surface life. Surface strengthening technology is a variety of surface treatment methods aiming at the insufficient surface properties of the parts to improve their service life.

3.1 Surface Repair Technology

The main surface technologies used in repair technology are surfacing technology, surface coating technology (such as plasma spraying, arc spraying, flame spraying, etc.), brush plating technology, electroplating technology and electroless plating technology.

3.2 Surface Strengthening Technology

In surface strengthening technology, there are mainly four aspects of surface treatment technology.

(1) Surface coating technology: Using the performance of the coatings to optimize the surface performance of the substrate, the substrate does not participate in the reaction of the coating, and contributes little to the composition of the coating. It is coated with a hardening layer on the surface of the part, which is about the order of micron-millimeter in thickness.

(2) Surface thin film technology: According to certain needs, special preparation technology is used to form sub-micron to micron film thickness on the surface of the substrate. From the atomic point of view, the surface of the film is discontinuous and uneven. There are vacancies, dislocations and other defects on the surface, and impurities are mixed in. It is coated with a hardening layer on the surface of parts, which is about several microns to hundreds of microns in thickness.

(3) Surface alloying technology: Some metal elements or non-metal elements are infiltrated into the surface of the matrix material by physical or chemical methods, thus changing the composition and structure of the matrix material to improve or obtain the required surface properties. At the end, it can form a diffusion strengthening layer on the surface of the matrix material.

(4) Surface composite treatment technology: This is the composite treatment of the above three technologies to form gradient structural materials.

Summarily, in this paper, hot dipping and thermal spraying technology are mainly studied, and their application prospects are also prospected.

4. HOT DIPPING TECHNOLOGY

4.1 Introduction of Hot Dipping Technology

Hot dipping technology is a kind of surface treatment method which has been widely used to make metal products for a long time. Generally, the treated parts are immersed in molten metal liquids, and the matrix material reacts with the coated metal to metallurgical bonding, thus having specific properties. Hot dipping technology mainly includes hot dipping galvanizing and hot dipping aluminizing technology. Hot dipping galvanizing technology is one of the most widely used anti-corrosion methods for steel in the world. Hot dipping aluminizing technology is more difficult, but it has also achieved industrial production. Combining hot dipping galvanizing and hot dipping aluminizing technology, hot dipping Al-Zn alloy is one of the new coatings developed rapidly in recent years.

Hot dipping technology has the advantages of simple process, such as reliable performance, low cost, high production efficiency, easy mechanized production, rapid application of coating, etc. Hot dipping plating has great appearance and good corrosion resistance. Therefore, hot dipping technology is widely used in steel corrosion protection, such as steel plate, bridges, iron towers, marine trestles, drilling platforms and derricks, civil buildings, etc.

4.2 Characteristics of Hot Dipping Technology

The hot dipping technology process is divided into three steps, pretreatment, hot dipping and post treatment.

The pretreatment step is to clean the oil stains (alkali washing or high temperature degreasing) and oxides (acid washing) on the surface of the plated parts.

The hot dipping step is to clean surface of the plated part and then be immersed in molten metal liquid to form a coating.

The post-treatment strep is the chemical treatment (such as passivation) and physical treatment (such as oil protection and shaping, etc.), which are treated to the products.

4.3 Hot Dipping Al-Zn Alloy

Hot-dip aluminized coating has many properties superior to the hot-dip galvanized coating. But hot-dip aluminized coating can not provide electrochemical protection for steel matrix as galvanized coating does. In order to integrate the advantages of aluminized coating and galvanized coating, hot dipping Al-Zn alloy coating has been developed.

Up to now, 55% Al-Zn alloy hot-dip coating is the most successful one which has been put into production and application in different scales. The nominal composition of 55% Al-Zn alloy hot-dip coating is 55% Al, 43.5% Zn and 1.5% Si. The coating also has a double layer structure. The outer layer is as rough as the aluminized coating, while the inner layer is Al-Zn-Fe intermetallic compound. The purpose of adding a small amount of silicon in the plating bath is to limit the growth of brittle layer. 55% Al-Zn alloy hot-dip coating exhibits excellent corrosion resistance in a variety of media environments. The results show that the corrosion resistance of 55% Al-Zn alloy coating is much better than that of galvanized coating, and in some cases it can be compared with that of aluminized coating. The oxidation resistance of 55% Al-Zn alloy coating at high temperature is better than that of zinc coating, which is similar to that of aluminized coating. The coating also has good heat reflection performance. 55% Al-Zn alloy hot-dip coating has been widely

used in construction, automobile, household equipment and other industries nowadays. Al-Zn alloy hot-dip coating will be the main development direction of hot-dip plating in the future [3].

5. THERMAL SPRAYING TECHNOLOGY

5.1 Introduction of Thermal Spraying Technology

Thermal spraying technology is one of the surface technologies widely used in equipment maintenance and mechanical manufacturing. Thermal spraying technology is a kind of surface processing technology that uses a heat source to heat the spraying material to the melting state, and then sprays it to the surface at high speed by air blowing to form the spraying coating. Thermal spraying technology can also deposit ceramic coatings on metal substrates. Combining the characteristics of high temperature resistance, wear resistance and corrosion resistance of ceramics with the properties of metal materials such as strength, toughness, machinability, conductivity and thermal conductivity to obtain ideal composite coatings has become an important direction in the field of composite materials and products. Thermal spraying materials can be divided into metal materials, special metal materials, organic polymer materials, ceramic materials and biological materials according to the types of materials. According to the coating structure, there are nano-coating materials, alloy coating materials, amorphous coating materials and composite coating materials composed of these materials. At present, in order to meet the requirements of multi-function and high performance of materials, the use of composite materials, nano-materials, new alloys or amorphous materials has become the main trend of thermal spraying materials.

5.2 Classification of Thermal Spraying Technology

Traditional thermal spraying technology can be divided into combustion method and electrothermal method according to different heat sources. The former includes flame spraying and explosive spraying, while the latter includes arc spraying and plasma spraying. In the recent years, with the further improvement of coating performance requirements, the majority of scientists have developed supersonic flame spraying and supersonic plasma spraying on the original basis. At the same time, laser spraying, reactive thermal spraying and cold spraying have been developed [4].

5.2.1 Flame spraying technology

Flame spraying technology, as a new surface protection and surface strengthening technology, has developed rapidly in the past 20 years, and has become a very active branch in the field of metal surface engineering. Flame spraying is the use of flammable gases such as acetylene, propane and oxygen combustion flame as a heat source, spraying materials to melt or near the melting state, then auxiliary gases such as nitrogen or compressed air to spray them to the surface of the substrate to form a coating.

The basic characteristics of flame spraying technology are as follows. Firstly, the general metal and non-metal matrix can be sprayed, and the shape and size of the matrix are usually not limited, but the small holes can not be sprayed at present. Secondly, the coating materials are extensive. The metals, alloys, ceramics and composite materials can be used as coating materials, which can make the surface have various properties, such as corrosion resistance, wear resistance, high temperature resistance, heat insulation, etc. Thirdly, the porous structure of the coating has oil storage, lubrication and friction reduction properties. The macro hardness of the spray coating containing hard phase can reach 450HB, and the spray welding layer can reach 65HRC. Fourthly, flame spraying has little effect on the matrix. The surface of the matrix is heated at 200-250 ℃, and the overall temperature is about 70-80 ℃, so the matrix has little deformation and none obvious organization change.

The shortcomings of flame spraying technology are as follows. The bonding strength between spraying coating and matrix is low, and it can not bear alternating load and impact load. What's more, the preparation requirements of matrix surface are high. And the flame spraying technology is affected by many conditions, and there is no effective detection method for coating quality.

5.2.2 Arc spraying technology

Arc spraying technology is one of the thermal spraying methods, in which two wires or linear conductive materials are sprayed as consumable electrodes. The arc energy generated between them is used to near-melt the electrode materials, and high-speed compressed air atomization is used to spray them onto the substrate.

Arc spraying technology takes arc as heat source, so it is required that the material sprayed must be conductive, usually only metal material. Non-conductive ceramic materials are difficult to be sprayed by arc, which is the biggest limitation of its application. However, arc spraying technology also has its outstanding advantages, which can be summarized as follows. Firstly, the bonding strength between the coatings and the substrate is higher, which is generally 1.5-2.5 times that of flame spraying coatings. This is because of the high temperature of melt particles and the large deformation of sprayed particles. In some cases, micro-diffusion metallurgical bonding structure can also be produced at the interface when arc spraying aluminium on steel substrates, which greatly improves the bonding strength of coatings. Secondly, the spraying efficiency is higher. Spraying efficiency refers to the weight of metal sprayed per unit time. With the increase of arc current, the efficiency of arc spraying can be increased by 2-6 times than that of wire flame spraying technology. Thirdly, energy

utilization rate is higher. The energy efficiency of arc spraying is 57%-67%, while plasma spraying is 4%-12% and flame spraying is 5%-13%. Fourthly, the economic benefit is much better. Compared with all other thermal spraying methods, arc spraying has the lowest cost, simple equipment and less than one third of the investment cost of plasma spraying. Because of the high energy utilization rate and the much cheaper electric energy in China than raw materials such as oxygen and acetylene, its operation cost can reach only 1/10 of that of flame spraying. Fifthly, it is easy to automate. Sixthly, it is safer. The use of electricity and compressed air, without the use of oxygen, acetylene and other flammable gases, its safety has been greatly improved.

5.3 Application of Thermal Spraying Technology

Thermal spraying technology can spray all kinds of metal and alloy, ceramics, plastics and non-metal and other solid engineering materials, so it can be made into functional coatings with various properties. It has flexible construction, strong adaptability, wide application and outstanding economic benefits, especially for improving product quality, prolonging product life and improving products. It plays an important role in structure, energy saving, precious metal material saving, work efficiency improving and cost reducing. Thermal spraying technology also plays an important role in the field of mechanical damage repair of various metal or non-metal parts. At present, it is mainly used in the following aspects.

Firstly, thermal spraying technology can make a lot of new parts such as stamping plastic and leather parts mould by arc spraying, ceramic nozzle or refractory metal nozzle by plasma spraying, radar fairing, high temperature furnace components, and engine parts of fiber reinforced titanium-gold composites.

Secondly, in the aspect of material modification, the chemical composition and structure of the surface of ordinary materials can be changed by thermal spraying technology to enhance some properties of the surface.

Thirdly, in the field of repairing old parts, thermal spraying technology can not only restore the size of the parts, but also strengthen the surface performance of the parts, and increase their lifetimes, which is of great economic significance.

Fourthly, special functional coatings such as wear-resistant coatings, corrosion-resistant coatings, high temperature-resistant coatings, shielding coatings, insulating spraying coatings and oxidation-resistant coatings can be prepared to improve the surface properties of materials [5].

6. CONCLUSION

With the development of science and technology, hot dipping and thermal spraying surface technology will replace many traditional technologies. Hot dipping technology will play an important role in corrosion protection of metal products. In the future, thermal spraying materials should continue to be developed in the fields of aviation, automotive electrical and electronic products, mechanical parts and biomedical fields. Surface technology, like other science and technology, is developing at an unprecedented speed. The first leap has been made, and surface engineering has been formed. It is bound to produce a second leap in the 21st century. Surface design must be included in any project or product design to achieve maximum economic benefits.

REFERENCES

[1]Gustavo Mendonca, Daniela B S, Mendonca, et al. Advancing dental implant surface technology from micron to nanotopography. Biomaterials, 2008, 29(28): 3822-3835.

[2]Ding Xiang, Cheng Xudong, Yu Xiang, et al. Microstructure and electrochemical properties of nanostructured WC–10Co–4Cr coating prepared by HVOF spraying. Transactions of Nonferrous Metals Society of China, 2018, 28(3): 487-494.

[3] Zhu Yingchun, Ding Chuanxian, Ken Yukimura, et al. Deposition and characterization of nanostructured WC Co coating. Ceramics International, 2001, 27(6): 669-674.

[4]Kh G, Schmitt-Thomas, H Haindl, et al. Modifications of thermal barrier coatings (TBCs). Surface and Coatings Technology, 1997, (94): 149-154.

[5]Hong Sheng, Wu Yuping, Zheng Yugui, etc. Microstructure and electrochemical properties of nanostructured WC–10Co–4Cr coating prepared by HVOF spraying. Surface and Coatings Technology, 2013(235): 582-588.

Discuss the application of automation technology in machining manufacturing

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Abstract: China's economic construction has achieved very good achievements since the reform and opening up, and many of its achievements have made the world look at it. In the context of technological development, automation technologies based on technologies such as the Internet and computers have been widely used in different fields. Machining and manufacturing are the key links in the mechanical production process. The application of automation technology can improve the production quality and production efficiency of the machine. At the same time, it can flexibly control the production process and improve the economic benefits of the company.
Keywords: Machining manufacturing; Automation technology; Application

1. INTRODUCTION

With the continuous development of science and technology, China's mechanical processing and manufacturing industry is developing very rapidly. China's society is constantly improving, and mechanical design and manufacturing are also constantly developing. The machinery manufacturing industry is a basic industry and an important industry to improve China's economy. The increasingly fierce competition in the economic market has brought enormous challenges to the machinery manufacturing industry [1]. In order to make China's machinery manufacturing industry have better development, we must adopt a newer technical model in mechanical design and manufacturing-automation technology [2].

2. INTRODUCTION TO AUTOMATION TECHNOLOGY

Concept, automation technology has a wide range, mainly including computers and electronic information technology. In the mechanical production process, the integration of this technology and manufacturing technology can promote the processing precision more refined, reduce the labor intensity of production personnel, improve processing efficiency, and ultimately achieve the goal of increasing revenue. The application of automation technology is simple and the operator can take advantage of the short time to master the various operations of the machining process. Application advantages, first of all, the application of automation technology for mechanical production can effectively improve processing efficiency. At present, China's science and technology and social economy have shown rapid development, bringing new opportunities for the development of the machinery industry, but the industry competition is also fierce. In order to improve the market competitive advantage of processing enterprises, it is necessary to adopt automated production technology. The application will increase production efficiency and help machinery manufacturers to highlight the competition. Second, the application of automation technology can save production costs. In the past, mechanical processing mainly used manual production methods, which not only had high manufacturing costs, but also was difficult to adapt to the large demand of the market due to mechanical quality and manufacturing speed. Introducing automation technology into the production process can reduce the labor cost input of the production enterprise, and at the same time increase the production speed, ensure the production quality, and meet the current market demand. Finally, using automation technology to participate in machine production makes it easier to control the production process. Through the use of automation technology, all kinds of machining monitoring data are transmitted to the software through the Internet, analyze the production data, find out the problems of the data, send signals to the production personnel, change the production mode in time, and ensure the accuracy of the mechanical quality [3]. Application of Automation Technology in Machining is shown in Figure 1.

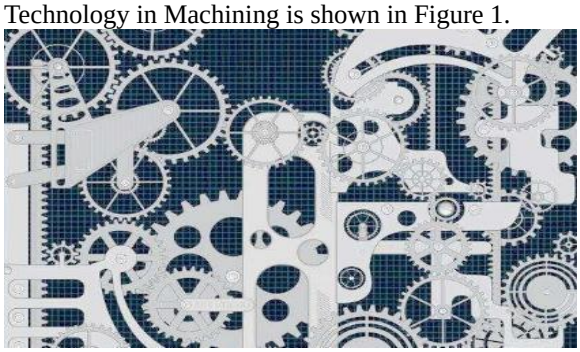

Figure 1 Application of Automation Technology in Machining

3. APPLICATION STATUS OF AUTOMATION TECHNOLOGY IN MECHANICAL DESIGN AND MANUFACTURING

Automation technology can be applied in many aspects. From the point of view of the equipment produced, the high-precision equipment used in production in China is basically imported. The core CNC system is mostly used by Siemens, Fanak, etc.

Foreign numerical control systems, CNC systems developed in China are rarely applied to actual production. For the automation management in mechanical design and manufacturing, the developed countries generally have self-developed automated management systems and are used in automated production. However, China still uses manual management methods in automation management, but some companies are moving towards automated production and are gradually expanding their automation equipment applications. Equipment such as automatic loading technology has also been gradually applied in actual production, bringing a lot of convenience to the machinery manufacturing enterprises.

4. MACHINING PROCESS AUTOMATION TECHNOLOGY APPLICATION

4.1 Flexible Automation Technology

Flexible automation technology is an automated machine manufacturing technology that can realize the processing, manufacturing, assembly and inspection of multi-variety and multi-batch mechanical products. It is based on CNC technology. Flexible automation technology can improve the resilience of mechanical manufacturing companies' product design and manufacturing, and can design and manufacture more mechanical products that meet the changing needs of the times according to the needs of customers and the market, thus contributing to the sustainable development of machinery manufacturing enterprises. In addition, it is also possible to adjust and control the flexible automated production technology through the automated information management system, and to control the manufacturing process of the mechanical products through the human-machine interface to ensure the controllability of the automated production line of the mechanical products, thus making it necessary for the mechanical manufacturing products. The design is improved and optimized to make it more responsive to the needs of the market and users.

4.2 Integration Technology

The integration technology is one of the automation technologies used in the mechanical production process. Under the application of this technology, the level of mechanical manufacturing is continuously improved, and the production factors of the production process and the management of various production activities are highly integrated. The application of integrated technology enables 3D model drive and machining. Based on the manufacturing process driving model, the manufacturing process of the two-dimensional environment can be applied to the three-dimensional environment to establish an MBD model, thereby generating a three-dimensional file, and simultaneously transmitting data with other mechanical systems. The machining plan is created using the 3D machine system, and then the geometric model is drawn using digital software, and the machining process is added to the guide model to form a three-dimensional production process. For example, an enterprise machine mainly manufactures aircraft mainframes. In the production process, integrated technologies such as CATIA and DELMIA are used to construct and simulate the model, and mechanical three-dimensional machining is performed under the application of integrated technology. The 3D machining system is used to complete the production process of the aircraft mainframe, and the geometric model of the machining process is established by DELMIA, and then the production process is managed using CATIA. According to the data, the mechanical production plan is formulated, the different production processes are refined, a complete production system is formed, the different management elements of the production process are integrated, and comprehensive management is carried out, which not only ensures the production quality, but also promotes the smooth management of the production process get on.

4.3 Integrated Application of Automation Technology

In the current mechanical design and manufacturing process, based on the high research and development cost of new products, traditional mechanical design and manufacturing is difficult to meet the relevant requirements, and greatly affects the mechanical design and manufacturing ecological environment, which makes the mechanical design and manufacturing have many shortcomings. However, the integrated application of automation technology can achieve a better solution to this problem, and greatly promote the development and progress of the enterprise mechanical design and manufacturing model. The integrated application of automation technology is mainly to optimize the mechanical design and manufacturing technology in combination with the related technologies of automatic control technology, computer technology and electronic technology, so that the various technologies in the automation technology can be successfully combined to make the whole design of the mechanical design. The process can be an organic whole and achieve a high degree of uniformity in the manufacturing process. In this way, during the operation of this system, each branch can effectively play its corresponding role, thus helping the enterprise to greatly improve the level of integration.

4.4 CAM Technology

In the machining process, the applied CAM automation technology belongs to the computer-aided type of technology. The application process depends on the computer platform and belongs to the important technology in the mechanical manufacturing industry. This technology is applied to the automotive industry and machinery manufacturing to automate the production process. For example, under the application of CAM technology, it promotes

the communication and transformation of information in the machining process, describes the structure of the processed product, and performs surface modeling to help to machine more complex parts. At the same time, the application of CAM can also control the movement of the machine tool. Machined tool location files are based on data obtained when the workpiece is stationary in the coordinate system. In the actual machining process, the tool continuously moves, according to the change between the workpiece and the tool position, the data in the file is unfolded in advance, and then various types of bed motion data are formed to realize the control of the machine tool stroke.

4.5 Informatization Application of Automation Technology

With the continuous development of information technology, the role of information technology has become more and more prominent in the whole technology field. Especially in automation technology, information technology has a very important role and value, and it is an important application of automation technology for effective application and implementation. Technical means. This is mainly because information technology mainly includes four parts: information acquisition, transmission, processing and application. Automation technology also includes three parts: information acquisition, processing and application. There is a close relationship between the two parties. At present, the continuous optimization and optimization of automation technology by means of relevant information technology has become an important research object in the industry, especially worthy of our attention, which will further enhance the informationization level of mechanical design and manufacturing.

5. CONCLUSION

All in all, in the mechanical production process, the rational application of different automation technologies can efficiently complete machining, control production costs, and flexibly control production processes. Machinery manufacturers should strengthen the application of various types of automation technology, refine the details of mechanical production, and improve production efficiency. In the future, automation technology will also promote machine manufacturing to achieve network manufacturing, produce more sophisticated machinery, and apply virtual technology to promote a wider range of applications.

REFERENCES

[1]Wang Yongzhen, Yang Jianwei. Practical analysis of application of electrical automation technology in mechanical manufacturing. Internal Combustion Engines and Fittings, 2019(10): 161-162.

[2]Hui Yuchen. Exploring the application of automation technology in mechanical design and manufacturing under the new situation. Internal Combustion Engines and Accessories, 2019(08): 205-206.

[3]Liu Wei. Analysis of the application of automation technology in mechanical design and manufacturing under the new situation. Shandong Industrial Technology, 2019(12): 23

Drug resistance of Mycobacterium tuberculosis

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Abstract: Tuberculosis is the second largest infectious disease in China. In 2011, 950,000 people suffered from tuberculosis and 2,840 people died. Although tuberculosis has been well controlled now, with the increase in the number of AIDS and the decline in the immunity of the population, tuberculosis is likely to return. In recent years, the use of various drugs has increased the proportion of drug-resistant Mycobacterium tuberculosis population. Many patients are infected with drug-resistant Mycobacterium tuberculosis, some of them are drug-resistant bacteria after a period of time. The emergence of drug-resistant bacteria is not conducive to the treatment of patients, so the industry is in the analysis of drug resistance, in order to suit the case, not to delay the disease. In this paper, we will discuss the drug resistance of conjugated bacteria, analyze the development trend of drug resistance in recent years, and give some suggestions on drug use.
Keywords: Drug resistance; Tuberculosis; Anti-tuberculosis drugs

1. BRIEF INTRODUCTION OF TUBERCULOSIS

Tuberculosis is the second largest infectious disease in China. In 2011, 950,000 people fell ill and 2,840 people died (data from the China Center for Disease Control and Prevention). Although tuberculosis has been well controlled now, with the increase of the number of AIDS and the decline of the group immunity, tuberculosis is likely to return.

Mycobacterium tuberculosis is the pathogen of tuberculosis. When a patient coughs, sneezes or speaks loudly, it is possible to form droplets nucleus with a single tuberculosis as the core suspended in the air. Once a person inhales the nucleus, he may be infected with tuberculosis. In addition, tuberculosis bacteria can adhere to dust after drying, and the dust formed is also infectious. The susceptible population is mainly those with low immunity, poor living conditions and genetic factors.

Infected tuberculosis patients sometimes only show high fever, sometimes hemoptysis, chest pain, systemic symptoms, such as sweating, fatigue, loss, weight loss, etc. Severe patients have difficulty breathing and systemic allergic reactions [1].

Examination methods include sputum smear, blood routine, chest X-ray, etc. At present, the first-line therapeutic drugs are isoniazide (H), rifampicin (R), ethambutol (E), streptomycin (S), kanamycin (Km), oflxacin (Ofx), etc.

Irregular treatment of patients and untimely medication may lead to the emergence of some drug-resistant bacteria, which not only make patients difficult to cure, high mortality, but also may cause the epidemic of supertuberculosis which can not be cured.

Initial drug resistance rate reflects the current proportion of drug-resistant bacteria in patients, and reflects the prevalence of drug-resistant bacteria. Re-treatment drug resistance reflects the level of treatment, whether patients take drugs on time, whether doctors prescribe symptoms and other issues. Doctors usually use the way of drug testing, and continue to take whatever medicine works well. This is blind. There is a great error in evaluating the therapeutic effect by subjective feeling. Moreover, blind drug taking has aggravated the proportion of drug-resistant bacteria in tuberculosis.

2. RESEARCH METHODS

In view of the trend of drug resistance of tuberculosis bacteria in recent years:

Participants: Bacterial culture positive cases were selected from clinic, among which:

In 1992, 597 cases, 356 cases of drug resistance, 225 males and 131 females were selected. There were 214 cases of drug resistance, 133 males and 81 females, 142 retreated cases, 92 males and 50 females.

392 cases were selected in 1996, including 299 drug-resistant cases, 214 males, 85 females, 222 newly treated drug-resistant cases, 153 males, 69 females, 77 retreated drug-resistant cases, 61 males and 16 females.

In 2000, 329 cases, 232 cases of drug resistance, 131 males and 101 females were selected. 181 cases of drug resistance were initially treated, including 100 males and 81 females. 51 cases of drug resistance were retreated, 31 males and 20 females.

In 2004, 356 cases, 181 cases of drug resistance, 126 males and 55 females were selected. There were 103 newly treated drug-resistant cases, 62 males and 41 females, 78 retreated drug-resistant cases, 61 males and 17 females [2].

Processing methods: Drug sensitivity tests were performed on all positive cultures, and the drugs used were in accordance with clinical practice.

Data Source: Drug resistance analysis of hospitalized tuberculosis cases from 1992 to 2004 - China Journal of Tuberculosis Prevention 2006.

Statistical method: Z test
Drug resistance differences caused by different drugs and combinations of drugs were analyzed.
Objectives: Random sampling of confirmed cases
Method of experiment: Drug susceptibility test
Data Source: Development and Change of Antituberculosis Drug Resistance Spectrum in Guangdong Province in Recent Ten Years - China Antituberculosis Journal 2011
Statistical method: Z test
3. DATA ANALYSIS RESULTS
Part1: Trends in drug resistance of tuberculosis bacteria, as in Table 1.
Table 1 Data collation of annual drug resistance rates

year	Initial drug resistance rate	Re-treatment drug resistance rate	Total resistance rate
1992	51.9	76.8	59.6
1996	79.9	67.5	79.3
2000	70.4	70.8	70.5
2004	40.4	77.2	50.8

Formula used:
Look up and see：Z≥1.96 时 P≤0.05，Significant difference
Z≥2.58 时 P≤0.01，The difference is very significant.
Table 2 Z-test of drug resistance rate at first treatment

	1992	1996	2000
1996	8.14**		
2000		2.54*	
2004			7.16**

* Significant difference was found in the expression of ** and extremely significant difference was found in the expression of ** and ** in the expression of ** and ** in the expression of ** and ** in the expression of ** respectively.
Table 2 shows that the drug resistance rate in 1996 was significantly higher than that in 1992, even reaching nearly 80%. In 1996, China actively carried out World Tuberculosis Prevention Day 3.24, which was launched by WHO, and actively carried out integrated prevention and control work. In 1996-04, the drug resistance rate decreased significantly. Preliminary results have been achieved in prevention and control.
Table 3 shows that the rate of retreatment resistance has not changed much in 92-04, and maintained at the level of 70%. It shows that personalized treatment is still difficult to achieve, and irregular drug use still exists widely in patients.
Table 3 Re-treatment drug resistance rate Z test:

	1992	1996	2000
1996	1.73		
2000		0.48	
2004			0.94

* Significant difference was found in the expression of ** and extremely significant difference was found in the expression of ** and ** in the expression of ** and ** in the expression of ** and ** in the expression of ** respectively.
Table 4 Total drug resistance rate Z test

	1992	1996	2000
1996	5.68**		
2000		1.75	
2004			5.39

* Significant difference was found in the expression of ** and extremely significant difference was found in the expression of ** and ** in the expression of ** and ** in the expression of ** and ** in the expression of ** respectively.
The table 4 shows that the anti-tuberculosis work in China has achieved initial results in 2004. The drug resistance rate returned to about 50%. Generally speaking, the control of tuberculosis epidemic after China's accession to the World Health Organization has been effective.
Analysis of Resistance Differences Induced by Different Part 2 Drugs and Different Drug Combinations
Table 5 Single drug resistance rate of smear positive patients in 2009Part2

medicine	Initial treatment of smear positive /%	Retreatment of Tuyang/%
H	7.6	15.2
R	4.8	11.2
E	3.3	6.3
S	9.8	12.8
Km	1.9	2.7
Ofx	3.2	4.8

It can be seen from the table 5 and table 6 that Km resistance is significantly lower than other drugs, Ofx resistance is also significantly lower than most other drugs, the use of these two new drugs is not long, so the proportion of tuberculosis bacteria resistant to these two drugs is not high, in a short time, the two drugs are still effective. Because H and S have been used for a long time, their drug resistance rate is significantly higher than other groups, the treatment effect of these two drugs is not good at this stage.
Table 6 Analysis of Drug Resistance Differences of Single Drugs at Initial Treatment in 2009

	R	E	S	Km	Ofx
H	2.877**	4.707**	1.932	6.690**	4.839**
R	-	1.884	4.777**	4.000**	2.022*
E		-	6.556**	2.179*	0.140

S			-	8.448**	6.683**
Km				-	2.042*
Ofx					-

Table 7 Analysis of Drug Resistance Differences between Initial and Retreatment of Single Drugs in 2009

H	R	E	S	Km	Ofx
4.192**	4.074**	2.447*	1.712	0.952	1.451

* Significant difference was found in the expression of ** and extremely significant difference was found in the expression of ** and ** in the expression of ** and ** in the expression of ** and ** in the expression of ** respectively.

It can be seen from the above table 7 that isoniazid and rifampicin are easy to induce drug resistance, ethanolamine is easy to induce drug resistance, which should be paid attention to by doctors. When prescribing drugs, it is better to do the corresponding testing.as in Table 8.

Table 9 shows that when the number of drugs used is three, the most lethal to bacteria, few bacteria can be resistant to the combination of three drugs. Compared with triple therapy, the difference of drug resistance was not significant when the number of drugs used was more than three. When a doctor prescribes a triple prescription (the combination of three drugs) and still fails to achieve the desired effect, drug types can be gradually increased, and we should note that the proportion of patients who are resistant to six drugs is significantly higher than that of other mixed drugs. This shows that when six drugs are combined, the bacterial resistance is significantly stronger than that of other groups, and the effect of six drugs is simultaneous use. It's not going to be good, and it will cause strong adverse reactions. as in Table 10.

The following analysis will help give some treatment advice from a statistical point of view.

Table 11 shows that for patients with H + R and H + S tolerance (the tolerance rate of these two conditions in the population is higher than that of other significant cases), the addition of any other drug can significantly reduce the bacterial tolerance.

By Z test, the resistance rates of H and H+R were significantly different, and the resistance rates of other drug-resistant units with H were lower than those of H+R group, so the mixed drug was effective for H-tolerant patients. Similarly, by calculation, the mixed drug was effective for S-tolerant patients with high tolerance rates.

Table 8 Data collation of resistance rate of smear positive patients in early 2009

Unit element	case	Drug resistance rate /%
H	18	1.5
R	6	0.5
E	0	0
S	48	3.9
Ofx	8	0.7
H+R	12	1.0
H+E	1	0.1
H+S	19	1.6
H+Km	1	0.1
H+Ofx	2	0.2
R+E	0	0
R+S	5	0.4
R+Ofx	0	0
E+S	4	0.3
S+Ofx	1	0.1
S+Km	3	0.2
H+S+Km	0	0
H+S+Ofx	4	0.3
H+E+S	1	0.1
H+R+E	2	0.2
H+R+S	0	0
H+R+Ofx	0	0
R+S+Ofx	1	0.1
R+E+S	3	0.2
H+S+Km+Ofx	1	0.1
H+E+S+Km	1	0.1
H+E+S+Ofx	1	0.1
H+R+E+Ofx	1	0.1
H+R+S+Ofx	1	0.1
H+R+S+Km	1	0.1
H+R+E+S	6	0.5
R+E+Km+Ofx	0	0
H+R+E+Ofx+Km	1	0.1
H+R+E+S+Ofx	5	0.4
H+R+E+S+Km	2	0.2
H+R+E+S+Km+Ofx	8	0.7

Table 9 Differences in drug resistance rates due to different drug use (data collation)

Number/species of medicines used	Drug resistance rate /%	Number/species of medication	Drug resistance rate /%
1	6.6	4	1.1
2	4	5	0.7
3	0.9	6	0.7

Table 10 Analysis results

	2	3	4	5	6
1	2.879**	7.507**	7.145**	7.881**	7.881**
2	-	4.986**	4.617**	5.421**	5.421**
3	-	-	0.510	0.555	0.555
4	-	-	-	1.048	1.048
5	-	-	-	-	0.000

Table 11 Differences in initial drug resistance rates among different drug-resistant units (2009) Comparison of three drug-resistant units and two drug-resistant units

	H	R	E	S	Km	Ofx
H+R			-2.56614*	-3.5162**	-2.56614*	-3.5162**
H+E		0.639282		0		
H+S		-4.46121**	-4.0557**		-4.46121**	-3.32282**
H+Km				-1.1069		
H+Ofx		-1.56618		0.495417		
R+E	1.566176			1.566176		
R+S	-2.21713*		-0.90484			-1.48685
R+Ofx	0			1.106899		
E+S	-1.10773	-0.49542				
S+Ofx	1.107731	0				
S+Km	-1.56618					

Note: The first row and the third column of this table - 2.56614 indicate the ratio of H + R + E to H + R, and the others are the same.

4. DISCUSSION

With the national attention to drug resistance, the work center of tuberculosis has been shifted from “treatment” to “prevention”, and the initial drug resistance rate of tuberculosis has improved significantly. Drug resistance in patients requiring medication is still not optimistic, which requires precise judgement by doctors and willful medication by patients.

Another group of studies found that, due to the long-term use of isoniazid and streptomycin, the tolerance of bacterial communities to these two drugs was significantly higher than others, and the combination of drugs can effectively reduce the tolerance of bacteria. Considering the side effects of drugs, doctors should still try to prescribe as few drugs as possible, such as triple, four or five.

The use of new drugs is the way to cure the symptoms but not the root causes. Although bacteria have been killed in a short time, it is inevitable that bacteria will be selected artificially and “super tuberculosis” will be produced in the future. People should bear in mind the example of super bacteria. Active prevention is the best way to control tuberculosis.

In addition, based on this study, we can reveal the nature of the differences among different drug resistance units by analyzing more data. For example, if there is no significant difference between two drug-resistant units in a longer time scale or in a larger sample size, we can guess that the two drug-resistant units have the same selective ability, and then we can guess the resistance mechanism of bacteria. For example, there is no difference in the proportion of H + R and H + R + S resistance, but the mechanism of isoniazid is to prevent the synthesis of bacterial cell wall, rifampicin is to block RNA transcription, streptomycin is to inhibit the synthesis of extracellular tuberculosis protein, and the combination of H + R and H + R + S is not different. It can be inferred that bacteria have enhanced the protection of protein synthesis while protecting their own cell wall synthesis and transcription pathways during evolution.

With the spread of AIDS, tuberculosis is coming back. Bacterial drug resistance is a problem that can not be ignored. Therefore, drug resistance research is still promising. The deeper the study of drug mechanism, the more reasonable its application. Only rational use of drugs can prevent the formation of superbacteria and prevent the future from falling into an incurable tuberculosis epidemic.

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REFERENCES

[1]Chen Liang. Analysis of the development and change of drug resistance spectrum of anti-tuberculosis drugs in Guangdong Province in recent ten years - Yin Jianjun. China Antituberculosis Journal, 2011.

[2]Liu Xiang, Chen Haifeng. Resistance analysis of hospitalized tuberculosis cases from 1992 to 2004. China Antituberculosis Journal, 2006

Research Progress of Soybean Protein

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Abstract: Soybean protein is the protein contained in soybean products. Soybean protein is a complete plant protein, and has rich physiological activities, and has an important health care role. In this paper, the research progress in extraction and application of soybean protein was reviewed.
Keywords: Soybean protein; Extraction; Application

1. INTRODUCTION

Soybean is the mature seed of leguminous plant soybean. Soybean food is one of the traditional foods in China, which plays an important role in the diet structure of China and many Southeast Asian countries. Soybean food is rich in physiological active substances and plays an important role in health care. In recent years, epidemiological studies have found that Asians are significantly less likely to develop breast cancer, prostate cancer, myocardial infarction, arteriosclerosis and other cardiovascular diseases than those in Europe and the United States [1]. This is related to the eating habits of the region, especially to the more soy food consumed in the daily diet of Southeast Asian countries.

Soybean protein, that is, soybean products (such as doufu, humus, etc.), contains about 38% of the protein, which is 4 times more than that of cereal. The amino acid composition of soybean protein is similar to that of milk protein. Except methionine, the other essential amino acids are abundant, which is a complete protein of plant nature and can be equal to animal protein in nutritional value.

The functional characteristics of soybean protein [2] in addition to nutritional properties, there are solubility, tissue formation, water holding capacity, swelling, emulsification, oil holding capacity, viscosity, gelation, foaming and so on. These physical and chemical properties play different roles in different product production. In the production of meat products, the solubility, water holding capacity, emulsification, gel and viscosity of soybean protein are the main factors affecting the quality of meat products, such as: soybean protein can promote the formation and stability of emulsion; reduce cooking loss and juice loss by binding fat and moisture; prevent oil separation and precipitation; promote stickiness between meat grains; improve water holding capacity and taste; Improve the hardness, flexibility and texture of the gel; play an antioxidant role to a certain extent; increase the nutritional value.

2. RESEARCH PROGRESS ON EXTRACTION TECHNOLOGY OF SOYBEAN PROTEIN

2.1 Comparative Study on Extraction of Protein from High Temperature Soybean Meal by Ddifferent Physical Methods.

Zheng Tianyao [3] compared the auxiliary effects of heating, homogenization, ultrasound and microwave on the extraction of soybean protein from high temperature soybean meal, and analyzed the polyacrylamide gel electrophoresis, particle size distribution, relative molecular weight distribution and thermal properties of the proteins extracted by different methods. It was found that the extraction effect of soybean protein was the best by heat treatment at 120 °C (0.1 Mpa, 20 min), and the protein extraction rate was 65.58%. The results of polyacrylamide gel electrophoresis, gel osmotic chromatography and particle size distribution showed that the relative molecular weight and particle size of the protein extract treated by heating, ultrasound and microwave were decreased. The results of differential DSC showed that there was still endothermic peak in the extract treated with homogeneous treatment, while the extract obtained by other methods had been completely denatured.

2.2 Extraction of Soluble Soybean Protein from Several salts.

The extraction of salt-soluble protein was carried out by using separate soybean protein and concentrated soybean protein as raw material and adding different proportion of phosphate. The results showed that 1% soybean protein and 0.6% NaCl solution and 0.3% mixed phosphate (sodium pyrophosphate: sodium hexametaphosphate: sodium tripolyphosphate = 4:2:4) could be well extracted [4].

Extraction of deodorization soybean protein [5-6].

In the process of extracting soybean protein, a new type of soybean protein with excellent flavor was obtained, which was much lower than the traditional soybean protein in the process of extracting soybean protein. The soybean protein was usually obtained according to the following procedure: soybean (flattened) → (defatted) →defatted soybean→ (extracted) →(dregs) →soybean milk →(acid precipitation) →(whey) → acid precipitated curd →(neutralized) →separated soybean egg from soybean protein solution →(dry) →soybean protein.

The first is the process of suppressing or preventing the smell of beans. Soybean flavor is mainly produced in soybean (flattening) stage and defatted soybean (water extraction) stage. Therefore, when flattening soybean, keep low moisture as much as possible and flatten soybean at low temperature, and when extracting soybean with water, pH value should be controlled so that lipopolysaccharide does not play an

important role. Then it is the source of eliminating the smell of beans. Soybeans themselves have a certain smell of beans. In the process of flattening and defatting, soybean is extracted with organic solvent, or conditional use of solvent can not only remove the smell of soybean itself, but also remove the source of the smell of soybean.

According to the results of the study, the method of eliminating the smell of soybean in a certain process was changed, but a variety of methods were used organically, which achieved the purpose of greatly reducing the odour of soybean protein. Specifically, there are four processes in the study. The first is to make the water content of soybean below 10% and flattened it; the second is to extract the dissolved components of soybean with organic solvent under the condition of below 70 °C; the third is to remove the residual organic solvent from soybean with temperature higher than the boiling point of solvent and the ambient temperature of 63 °C - 95 °C; and the fourth is to put forward the protein in soybean with water under the condition of isoelectric point.

3. RESEARCH PROGRESS OF SOYBEAN PROTEIN IN APPLICATION

3.1 Application of Soybean Protein in Cake

Cake is a popular convenience food, with its good taste and flavor to win the market. However, traditional cake is a kind of high sugar and high energy food. Long-term consumption or excessive intake will induce obesity, cardiovascular diseases, and pose a threat to human health. If soybean protein can be added to the cake, it can not only improve the nutritional and health care value of the cake, but also make full use of the processing characteristics of soybean protein and improve the processing performance of the cake. Research found that [7-10]: (1) with the increase of soybean protein content, the hardness of cake decreased, and when the addition of soybean protein was 6%, the hardness of cake reached the minimum, and when the addition of soybean protein was more than 6%, the hardness of cake began to increase again. (2) with the increase of soybean protein content, the sensory quality of cake improved, when the addition amount was 9%. The comprehensive score of cake is 91, which indicates that proper addition of soybean protein can effectively improve the quality of cake. (3) the addition of soybean protein has a certain effect on the water content of cake. With the increase of soybean protein content, the water content of cake increases obviously, which may be due to the fact that the water holding capacity of soybean protein is better than that of flour, which can better prevent water migration and maintain moisture in the process of cake making.

3.2 Application of Soybean Protein in Bread Making

Bread is a kind of baked food that the public likes very much. In recent years, in order to improve its processing and nutritional quality, many scholars at home and abroad have studied it. Research [9-13] found that: (1) when the content of soybean protein was 2%, the specific volume of bread hardly changed. When the content of soybean protein was more than 2%, the specific volume of bread decreased with the increase of soybean protein isolate. (2) with the increase of soybean protein isolate, the moisture content of bread increased obviously. (3) when the addition of soybean protein isolate was 2%, Compared with the control group, the hardness of bread decreased, the elasticity increased, and the mouth resistance decreased. When the addition rate was 8%, the indexes changed significantly, the hardness and nozzle resistance increased significantly, and the elasticity and recovery decreased significantly. The addition of 2% -8% had no obvious effect on the texture of bread. (4) the sensory quality of soybean protein bread decreased with the increase of soybean protein content, which was not different from that of the control group at 2%, but the color of the core was slightly yellow than that of the control group, which was due to the addition of soybean protein. When the content of bread was more than 4%, the sensory quality of bread decreased obviously, the volume decreased, the surface color became darker, the color of core was yellowish brown, and the elasticity became worse. The stomata in bread were large, the pore wall was thick, and the smell of beans was obvious. (5) the water loss rate of bread decreased gradually with the increase of protein content, and the water loss rate also decreased gradually. This is mainly due to the fact that many polar genes can absorb water in the long chain of soybean protein structure, and the soybean protein-starch complex can inhibit the escape of water from starch, reduce the aging rate of starch, maintain the softness of bread and prolong the shelf life of bread.

3.3 Application of Fermented Soybean Meal Instead of Soybean Meal in Feed

The fermented soybean meal is a high-quality protein raw material obtained by degrading and modifying the peeled soybean meal by scientific formula and advanced processing technology, Is an ideal raw material and a protein supplement for livestock and poultry feed, and can replace some high-protein raw materials such as fish meal, bean pulp and the like, thereby reducing the feed cost. Research found that [14-16] the soybean protein content of the fermented soybean meal was increased by 16% compared with that of the soybean meal, the digestion rate was increased by 19%, the metabolism energy increased by 8.7%, and a large amount of probiotics was contained. And the comprehensive nutritional value is greatly improved. The experiment shows that the fermented soybean meal instead of one-half of the soybean meal can not only increase the growth rate of the broiler, increase the daily gain of 11.2%, but also the feed rate is high, and the meat-to-meat ratio is lower than 10.6%. Therefore, in the case of the good price of the broiler, the partial fermented soybean

meal is used for replacing the soybean meal, and the comprehensive economic benefit is still considerable.

4. THE PROSPECT OF SOYBEAN PROTEIN

At present, the main products of soybean protein in China are defatted soybean powder (protein content more than 50%), protein concentrate (protein content more than 68%) and protein isolate (protein content more than 90%). The market demand of soybean protein concentrate is increasing year by year [17-18]. Because the protein concentrate produced by alcohol method has the advantages of high protein yield, relatively low price, almost no waste in the production process, oligosaccharide, isoflavones and other bioactive substances can be obtained at the same time, so it has a broad prospect of development and application. Alcohol soybean protein concentrate and its modification process have been improved for many years since it was put into commercial operation in 1960s, and it has been relatively mature at present. Especially in the case of serious overcapacity of soybean protein isolate products in China, how to convert a large number of idle oil leaching equipment and soybean protein isolate production equipment into soybean protein concentrate production equipment is an urgent problem to be solved in soybean processing industry. The functional alcohol soybean protein concentrate with high quality and low price has the trend of replacing soybean protein isolate.

In recent years, Chinese scientific and technological workers have made some achievements in enzyme-modified soybean protein, and the pilot-scale product and industrial production of soybean peptide (hydrolyzed protein) products have been successful. The results showed that soybean peptide products were easy to digest and absorb, the molecular weight was small, and there was no smell of soybean. Under the conditions of heat, acid and alkali, there is no denaturation, the NSI value is more than 95%, and it has the characteristics of good solubility and so on. These products have the functions of reducing cholesterol, lowering blood pressure and losing weight in health food; can supplement protein in infant milk powder; as athlete food can quickly restore physical strength, but also can be used as a nutritional agent for special patients. In addition, the application of soybean peptide in cosmetics, medicine and feed has also been developed and studied, and some achievements have been made.

Foreign countries have used modified technology to produce multifunctional, special soybean protein products. Such as high emulsification type, high dispersion type and gel type. The chemical, physical and enzyme modification of alcohol soybean protein concentrate can further produce functional alcohol soybean protein concentrate products which are widely used in infant food, dairy products, ice cream products, baked food, meat products and so on. This has become an important development direction of soybean protein and the focus of attention of enterprises. There is still a certain gap between China and foreign products in the variety of functional soybean protein products, so it is urgent to strengthen the research and development in this field.

REFERENCES

[1]Messina M, et al. Soy intake and cancer A review of the in vitro and in vivo data. Nutr Cancer, 1994, 21: 113-131.

[2]Zhou Jie, Chen Tao. Functional characteristics of soybean protein and its application in meat products. Meat industry, 2009(11): 46-49.

[3]Zheng Tianyao, Yang Xiaoquan. Comparative methods for extraction of proteins from high temperature soybean meal by different physical methods. Chinese grease, 2009, 34(12): 22-25.

[4]Lin Jinying, Jiang Dabin. Studies on the extraction of soluble Soybean protein from several Salts. Meat Industry, 1998(10): 29-30.

[5]Fan Weijiang, Wang Libin, Wang Lidong. A preliminary study on the removal of soybean flavor by enzyme method. Food Research and Development, 2016, 37(11): 96-98.

[6]Jiang Lianzhou, Hu Jiying, Liu Yaohua. Research progress in key technologies of soybean milk powder processing. Journal of Agricultural Machinery, 2019, 50(6): 1 -11.

[7]Qiao Julin. Study on the Application of Soybean protein in Cake. Food industry science and technology, 2007(12): l30-132.

[8]Lu Ning. Study on the application of soybean dietary fiber in cake production. Food Industry Science and Technology, 2002(11): 63-64.

[9]Ren Juan. Analysis of the use of soybean protein in baked food. Modern Food, 2017(20): 38-39.

[10]Meng Nan, Fan Zhenjiang. Application of soybean protein in baked food. Modern Food, 2016(20): 68-69

[11]Qian Haifeng. Effect of different kinds of soybean protein powder on bread processing characteristics. Journal of Agricultural Engineering, 2006(10): 233-236.

[12]Zhang Hui. Study on the effect of soybean protein isolate on bread quality. Food and fermentation Industry, 2007(9): 96-99.

[13]Working E B.The action of phosphatides in bread dough. CerealChem, 1997(5): 23-24.

[14]Du Jizhong. Application effect of fermented soybean meal instead of soybean meal on fast rhubarb feather broilers. Poultry breeding and prevention and control of poultry diseases, 2009(8): 14-15.

[15]Qin Guixin. Improvement of feed quality of plant protein source. Feed and Animal Husbandry, 2019(06): 54-59.

[16]Wang Yongwei, Song Dan, Li Aike. Research progress in the development and application of fermented feed resources. Chinese Feed, 2019(11): 75-80.

[17]Li Mexin, Wang Yu, Li Zhenlan, et al. Application

and Prospect of Soybean protein in Food processing in China. Grain processing, 2010, 35(1): 83-86.
[18]Liu Hong, Yi Lisa, Pu Yiqin, etc. A survey of wild leguminous plant resources and legume proteins in China. Biological resources, 2019, 41(3): 185-194.

Exploring the Mixed Teaching of Crew English under the ESP Concept

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Abstract: At present, China's high-speed rail development is very rapid, and the demand for high-speed rail crews has increased significantly. In this situation, it is extremely urgent to cultivate better and better high-speed train crews. In order to adapt to the development of China's internationalization, the English ability of flight attendants is crucial. Under the guidance of the ESP concept, the situational teaching method can enable students to feel the context of the time and respond accordingly, which helps students to learn English and smoothly go to work.
Keywords: ESP; Crew English; Situational teaching

1. INTRODUCTION

From a linguistic point of view, Crew English is in the category of Special Purpose English (ESP). Domestic colleges generally offer such courses in the second year, which can be subdivided into sub-courses such as oral English, listening, and intensive reading. The purpose is to enable students to master specific industry terms, familiar with the normative tone of speech, chapter structure. The semantic category and the pragmatic effects that match the actual context, thus meeting the actual needs of students' jobs [1]. From the perspective of professional ability, the English of the crew needs to integrate the post specifications and requirements of the flight attendant's "knowledge goal, ability goal, career goal" in the professional teaching standard. How to effectively combine the two in classroom teaching, and to cultivate high-quality professional graduates who are proficient in language and service skills and rich in culture have always been the direction of the teachers.

2. THE NECESSITY OF CULTIVATING ENGLISH ABILITY OF CREW STUDENTS

If the high-speed rail is a national business card, then the crew of the high-speed rail EMU is the "image spokesperson" of the high-speed rail [2]. The passengers' every move will affect the overall impression of the passengers on China's high-speed rail [3]. English communication skills are an important part of training crew members. In the context of globalization, the exchanges between countries in the world are becoming more and more close. The crew members can only serve each passenger and have a comfortable ride experience by mastering the proficiency in spoken English [4-5].

In the actual teaching, the school should pay more attention to the students' oral communication ability, and should also investigate the students' comprehensive expression ability. The best situation is to use English to explain the folk customs, cultural knowledge and emergency response knowledge in addition to oral communication.

3. TEACHING PHILOSOPHY

Compared with general knowledge English or college English, the former emphasizes the application of basic language skills, and the test-oriented orientation of listening, speaking, reading, writing and translating, so that most of the students go to college English exams for grades three, four and six. Teachers have a long time to explain in class, and students are passively combined. Even with a small number of presentations or adaptations, students spend less time actively in the classroom. Although many teachers are consistently input, the actual output of students is of little effect. At the same time, the classroom is mainly focused on knowledge explanation. On the contrary, as a part of English for professional English, in addition to the penetration of knowledge and culture, it is necessary to involve professional skills and multi-faceted training. In addition to familiarizing students with some of the professional skills that flight attendants should possess, teachers should also develop students' communication skills, teamwork skills, planning and design skills, problem-solving skills, self-management skills, and network technology application capabilities in a viable manner. Refer to Australia's TAFE "AVI20208 Aviation Level 2 Certificate" training, which includes 10 self-learning and technical applications. Its resources cover 35 units in 23 fields. Therefore, professional teachers should learn to effectively configure classes. The proportion of extracurricular knowledge and ability to teach. With the advent of the era of MOOC and micro-courses, students' online self-learning ability is indispensable. Teachers can use the online interactive platform of "excellent course" or "Mu class micro-course" to break the time and space between teachers and students, and it is necessary to answer. At the same time, in addition to the explanation of language and culture, teachers can also introduce the corporate culture of different airlines. Especially the case of excellent airlines at home and abroad. From a learner to a variety of roles such as facilitator and assessment. In the design of the group

activities, he is qualified as a director; in the professional ability display, he is qualified to become a trainer.

4. TEACHING METHOD

The situational teaching method is a relatively new teaching method, which was developed by the original "speaking and listening method". In this mode, the teacher will create a specific situation for the student, use the knowledge learned in the situation, and achieve the purpose of learning without knowing it. This method is more intuitive to use in English teaching. Students engage in dialogue in specific contexts. This way, students will have a stronger interest in the content of the course. In the stage of preparing for performance, students also need to consult. A large amount of information, this process is also the process of students' reserve knowledge. In the dialogue drill, through the conversations, stimulate and train the students' language modules and train their responsiveness, which will be of great benefit to the actual work in the future.

Most technical school students have a problem when they first enter the school, that is, the foundation is poor and can't keep up with the progress of the study. In this case, some students began to give up on themselves, neglected to learn English, lacked concentration in the classroom, did not take the initiative to learn under the class, and lost confidence in English. In addition, in the context of paying attention to practice, it is difficult for students to raise interest in cultural courses. At the same time, due to the lack of language environment and the lack of a strong learning environment, some students who want to improve their English ability can't find a suitable method for them. They can't find a partner to learn together. The method is not right and the English level is stagnant. These are all problems that need to be solved in current English teaching. The students did not have a good context in their previous English studies, and they lacked oral practice, resulting in the status quo of "learning, not wanting to learn, not learning." Therefore, the English situational teaching of the crew major should proceed from the students' actual situation, can not be eager to seek success, need to patiently enlighten the students, abandon the negative attitude of the past, and regain the enthusiasm for learning English.

5. CONCLUSION

Effective teaching concepts need to be equipped with effective teaching methods, and more need to have a teaching design mind. Based on the current strategy of "taking practical purpose and employment-oriented" for vocational college students, English teachers should adopt the first-line skills of developing good foreign language communication ability and certain reading translation ability when choosing teaching methods. The type of flight attendant is his duty. In the ESP teaching, give full play to its various roles and effectively implement the task module teaching. While cultivating students' ability to take English in English, they will expand their relevant professional abilities and finally realize the task-based teaching mode of "Language and Skills Equal, Culture and Emotional Harmony".

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REFERENCES

[1]Hutchinson. T & Waters. A. English for Specific Purposes. London: Cambridge University Press, 2017.

[2]TAFE.AVI20208 Certificate II in Aviation (Flight Op-eration). Sydney, 2015.

[3]Zhang Yanfang, the original two guarantees. Study on the Reform of Practical Teaching in Higher Vocational Colleges-Taking the Construction Management of Shanxi Construction Vocational and Technical College as an Example. Education Theory and Practice, 2016(9).

[4]Fan Shuimao, Ma Zeqiang. Research on Practice Teaching Reform of Public Administration Majors in Agricultural and Forestry Universities-Taking Xinjiang Agricultural University as an Example. Educational Theory and Practice, 2016(3).

[5]Lu Yong, Ni Ziyin. "Excellent Plan" Professional Practice Teaching Reform Drives Theory Teaching Innovation Exploration. Tianjiang Higher Education, 2016, 187(3): 90-92.

[6]Li Zhanghong. Analysis on the Reform Ideas and Practical Measures of the Practical Teaching of Financial Management Major in Higher Vocational Colleges. Shandong Social Sciences, 2015(2).

Research on Application of Artificial Intelligence in English Teaching in Higher Vocational Education under Information Environment

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Abstract: The continuous advancement of science and technology and the continuous development of the times have enabled China to quickly enter the era of artificial intelligence. In the information environment, artificial intelligence has begun to penetrate college English teaching, providing a large corpus, and learners can practice college English skills through artificial intelligence platforms. Artificial intelligence brings more learning resources and changes the way learners learn. Artificial intelligence can analyze learners' personal characteristics, design suitable learning methods for them, choose a reasonable corpus, and match comparable learning resources, making college English learning more efficient and personalized.

Keywords: Information environment; Artificial intelligence; Vocational English teaching; Application

1. INTRODUCTION

Through continuous efforts, reform, development and innovation, China's education industry has achieved very good achievements. Under the new era, with the national "Belt and Road" initiative and the construction of innovative national strategic initiatives, upgrading national language capabilities has become a national strategy. An important part of. If English teaching in higher vocational colleges is to be combined with the times, combined with national conditions, and combined with workplace requirements, it is necessary to improve teaching quality, reform and innovation, change the previous single teaching mode, make full use of artificial intelligence technology, and adopt a new and practical teaching system. And continue throughout the entire English teaching process to improve students' professional English and general English application skills.

2. THE CONNOTATION AND DEVELOPENT OF ARTIFICIAL INTELLIGENCE

"Artificial Intelligence," full name ArtificialIntelligence, was originally presented at a seminar held at Dartmouth University in the United States in 1956. Artificial intelligence is a new technical science that is used to research, simulate, develop, and extend and extend a methodological theory and application system of human intelligence. The application of artificial intelligence in foreign education fields such as the United States, Europe and Japan started earlier and began in the 1950s. In 1963, Feigenbaum edited the first classic book "Computers and Thoughts" about artificial intelligence. In 1987 NilsJohn Nilsson wrote a textbook on artificial intelligence. At the end of the 20th century, artificial intelligence experienced a period of low, but after the 21st century, researchers began to study artificial intelligence and developed many artificial intelligence products. Researchers believe that artificial intelligence has a good role in promoting education. Educational artificial intelligence mainly enables students to participate in teaching through computer and teaching platform, help teachers to teach more effectively, and emphasizes the future combination of the power of artificial intelligence and the advancement of robotics; LuckinR, HolmesW (2016) pointed out Educational artificial intelligence is a new research field formed by the combination of artificial intelligence and learning science [1]. The goal of educational artificial intelligence is to create conditions for students' learning by observing and understanding the learning process. RollI and WylieR (2015) analysis The research focus and application scenarios in the field of educational artificial intelligence, and predictions for future education [2]. OzbeyN (2016) and others analyze the factors affecting students' learning by analyzing artificial intelligence technology, and propose optimization methods for factors affecting students' learning process [3]. Tiffany Barnes (2017) et al. studied the application of artificial intelligence to computer teaching, pointing out that artificial intelligence is a more efficient means to promote computer science learning and teaching; Kanda conducted a practical evaluation of teaching robots in assisting primary school students in English learning, and the results showed that teaching Robotic learning English learners have a facilitating role. In terms of artificial intelligence products, in 2015, Bayne developed the intelligent teaching assistant Botty, which was used in the flip classroom teaching. This product effectively improved the teaching effect and improved the

teaching efficiency. In 2016, Holotescu designed and developed the service platform. The teaching robot MOOCBuddy, which can vary from person to person to recommend different learning resources for learners [4].

3. APPLICATION OF ARTIFICIAL INTELLIGENCE IN ENGLISH TEACHING IN HIGHER VOCATIONAL COLLEGES

3.1 Analysis of Learners

Artificial intelligence systems can analyze them according to the characteristics of learners, and set up a personalized learning method for them. Learners can use the Internet to learn at the right time. According to the results of its learning, artificial intelligence calculates the learner's mastery of knowledge, and provides personalized exercises to further consolidate. Teachers can also analyze the results of artificial intelligence, adjust the teaching design, and set the key points of the course.

3.2 Knowledge Explanation Module

Under the reform of college teaching, the focus of English teaching has shifted. In this module, teachers can use text or video to explain the basics. In addition, students can ask questions directly using natural language processing and expert system technology, and the module will use a large knowledge base to answer them.

3.3 Design a Suitable Learning Method

Each learner's learning style and ability to receive knowledge are different. Artificial intelligence can select appropriate learning content according to the learner's situation, set learning objectives, develop a personalized learning plan, and break through the learning difficulties. Provide different ways of learning. Teachers can also adjust the teaching methods when teaching the course according to the test results of the learners, and try to teach them according to their aptitude.

3.4 Artificial Intelligence and Artificial Intelligence + Education

Artificial intelligence, as its name implies, makes machines work intelligently like humans. The case of the Alpha dog overcoming Ke Jie made us realize the power of artificial intelligence technology. Artificial intelligence provides a great imagination for future life, and education is considered to be one of the best application scenarios for artificial intelligence. If we can make full use of artificial intelligence + education, exploring new teaching modes based on artificial intelligence will have a positive effect on vocational English teaching. Artificial intelligence + education essentially liberates teachers and students from some inefficient and repetitive work, making education more efficient. Specifically, the artificial intelligence system collects and analyzes the student's learning data through data mining technology, monitors the entire teaching process, diagnoses the student's learning situation and learning effect, and establishes a multi-dimensional evaluation system. Through the big data analysis, each student's learning habits and learning characteristics are sketched out, so that teachers can adjust the various links in the teaching process to meet the individualized requirements of the students' teaching content, teaching form and learning time space, and realize the teaching according to their aptitude. The more data is accumulated, the more the artificial intelligence learns the learning rules and requirements of the students through machine algorithms and learning, the evolution of the teaching model can be continuously improved, the teaching effect is getting better and better, and the learning efficiency of students is getting higher and higher, eventually forming. A virtuous circle. With the wide application of artificial intelligence + education, the student-centered intelligent learning platform has been vigorously developed, and individualized learning resources have emerged in an endless stream, which has laid a solid foundation for the realization of daily education and lifelong education customization.

3.5 Choose a Reasonable Corpus

Faced with the huge corpus of artificial intelligence + Internet, learners often have no choice. They can use artificial intelligence to analyze corpus and teaching resources. According to the personal characteristics and learning style of learners, the most reasonable corpus can be selected. Learners can Study in your spare time. Teachers do not need to waste too much time. They only need to select corpora for students to learn according to the analysis results of artificial intelligence, so as to improve teaching, stimulate learners' interest in learning, and promote learners to learn efficiently.

3.6 Matching Comparable Learning Resources

Artificial intelligence can analyze and predict according to the learner's learning situation and test data, and match the personalized learning resources that are most suitable for learners, so that each student can hear the content related to the teaching content and the content that he is interested in. After artificial intelligence matching, it is the most suitable for learners. This way, you can eliminate the powerlessness of learners who can't understand, understand, read, or write in college English learning. Make the learning process more interesting and targeted.

4. CONCLUSION

In summary, the information age has arrived, and artificial intelligence has brought new opportunities to the education community. After integrating artificial intelligence, higher vocational English teaching has begun to show multi-modal development. Applying artificial intelligence to higher vocational English teaching is beneficial to students to understand their own learning style, using artificial intelligence platform and software, listening, speaking, Read, write, translate, etc. to practice effectively and enhance the quality of learning. Teachers can also use artificial intelligence to engage more students in the

teaching, to understand the learning situation of each student, and to personally counsel them. Curriculum reform is the problem we are facing now. How to change, change what, and change direction is the question that our educators should think about. The emergence of artificial intelligence promotes the innovation of teaching mode and changes the teaching mode of teachers. It updates the students' learning methods and provides a new idea for curriculum reform.

REFERENCES

[1]Hua Wei, Chen Lin, Sun Mengmeng. Research on artificial intelligence to promote English learning change. Modern Distance Education, 2017(6): 27-31.

[2]Wang Tingting, Ren Youqun. Talent Strategy in the Age of Artificial Intelligence---Interpretation of "Innovative Action Plan for Artificial Intelligence in Colleges and Universities". Journal of Distance Education, 2018(5): 52-59.

[3]Wu Yonghe, Liu Bowen, Ma Xiaoling. Building an Ecological System of Artificial Intelligence + Education. Journal of Distance Education, 2017(5): 27-39.

[4]Chen Ying. Application of artificial intelligence in middle school English teaching. Nanchang University, 2013.

Research on Innovation of Cold Chain Logistics Distribution Network of Fresh Agricultural Products Based on O2O Mode

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Abstract: The rapid development of science and technology has enabled China to quickly enter the stage of modernization. Fresh produce O2O is one of the most close to consumers, with obvious characteristics of small group and individuality. It is a brand-new business model, which will lead the mainstream model of fresh e-commerce development in the future. However, China's current logistics, the development situation is not optimistic, which seriously affects the development of O2O for fresh produce.
Keywords: O2O model; Cold chain logistics distribution of fresh agricultural products; Network innovation research

1. INTRODUCTION

In recent years, China's economic construction has developed rapidly, and it is inseparable from the support of various industries [1]. With the gradual improvement of the development level of computer Internet technology, various advanced computer application technologies have been applied to the product production and internal management of various industries, which has further promoted the development of various industries. As far as China's agricultural product logistics and distribution is concerned, the formation and development of the O2O model has effectively improved the traditional logistics service [2]. This model has won the favor of customers with its short delivery time and convenient service.

2. BRIEF INTRODUCTION TO O2O MODE

O2O mode is the abbreviation of OnlinetoOffline. It belongs to an economic business form that combines traditional offline business with modern Internet technology and uses online IoT trading platform as the medium to drive offline products. The development of the O2O model is to guide real consumers to the consumer experience in the real world, so that consumers can pay for transactions by purchasing offline business or services online, and then get the real service experience and product experience [3]. Different from the B2C model, the O2O model pays more attention to the post-transaction service function, especially in the tourism, catering and catering industries in some medium-sized cities and large cities. At this stage, it has become the key business development of many e-commerce. With the improvement of people's living standards, the requirements for various services and commodities have also been put forward more personalized requirements. The O2O model of agricultural product logistics and distribution services will usher in a better development momentum.

3. DEVELOPMENT STATUS OF FRESH AGRICULTURAL PRODUCTS UNDER O2O MODE

Fresh produce is almost never processed, and products that cannot be preserved for a long time at normal temperatures, vegetables, fruits, etc. are counted as fresh produce. However, fresh agricultural products are indispensable in people's daily life. Their demand is very large. This requires suppliers to supply such products in a timely and rapid manner. Therefore, fresh agricultural products have become a lot of enterprises in order to increase income. A priority product category. The competition in 2012 is particularly large. China's current O2O is generally the four modes, the first is a comprehensive platform e-commerce represented by Tmall Jingdong, the second is a vertical e-commerce similar to the COFCO I bought the net, the original living network, etc. The third category is the logistics company, and finally the offline supermarket Wal-Mart. According to relevant data, in 2013, fresh enterprises increased by 221 percentage points, the transaction amount reached 13 billion yuan, and the cold chain logistics transaction amount was 3.9 billion yuan. Although fresh produce has a high development prospect, it is also a well-known difficulty. Compared with some traditional commodity sales and 3C products, it has some different characteristics. For example, the production quality of fresh agricultural products is different. There are good and bad, can not be sold in large quantities; the shelf life is very short, it is not easy to save, it is easy to deteriorate; the transportation requirements are extremely high, so the transportation cost is large; the habits of consumers are easy to change, and it is not easy to have a group of special customers. The profit is fluctuating.

4. THE DILEMMA OF FRESH AGRICULTURAL PRODUCTS DISTRIBUTION UNDEER O2O MODE

4.1 Logistics and Distribution Costs are Higher

In the operation process of fresh produce O2O mode, it is necessary to provide consumers with the last mile delivery service, that is, in the distribution process, it will involve the delivery of physical goods offline delivery service to consumers, and this is also the actual operation process of O2O mode. A more difficult point. In the actual operation process of O2O mode, we must consider the freshness of fresh agricultural products, traffic conditions, delivery timeliness, logistics and distribution costs, etc., and must be quickly delivered to customers after the products are shipped out of the warehouse. In the hands. In addition, the fresh agricultural products themselves have high requirements for the logistics cold chain technology. However, the current development status of China's technology is still not able to meet the distribution demand, which also restricts the operation and operation of the O2O model.

4.2 Product Quality is Different and it is Easy to Deteriorate During Distribution

The value of fresh products lies in fresh, and we must guarantee the quality of the products, but the premise is to have strict production lines and standards to ensure that the products produced have good quality. However, most of the producers of fresh produce are small-scale producers such as farmers, so it is a good standard to fail to achieve product quality at the beginning. There is also the fact that most farmers produce products with limited funds and general production techniques, so the quality of the products is definitely different. Based on the characteristics of the fresh product itself - the characteristics of perishable and easy to break, the difficulty in the distribution process is even greater, and it is necessary to alleviate the deterioration and corruption of the product in various aspects and increase the safety of the product.

5. COUNTERMEASURES FOR THE DEVELOPMENT OF FRESH AGRICULTURAL PRODUCTS LOGISTICS UNDER O2O MODE

5.1 Ensure the Security of the Transaction Process

First of all, we must strictly control the quality of suppliers. The O2O e-commerce platform itself is a third-party role. Therefore, in order to ensure the quality of suppliers' products, we must strictly review the fresh produce for the suppliers and formulate corresponding rules and regulations. Constraining suppliers to better protect consumer rights and ensure the safety of online purchase of fresh produce. Secondly, it is also possible to set up a consumer feedback mechanism to evaluate suppliers through third-party institutions, and consumers can standardize supplier behavior by means of scoring, feedback and complaints, which will further enhance suppliers. The quality of fresh produce, avoiding the phenomenon of deceiving consumer behavior. Finally, in the process of development, third-party payment platforms can be improved. After all, Alipay has become a more common means of payment, so in order to enable consumers to have a better experience, construction can be strengthened in this respect. Ensure network payment security while better meeting the user's personalized experience.

5.2 Improve the Consumer Experience and Enhance Online and Offline Interactivity

The consumption experience of O2O e-commerce for fresh produce can be divided into two aspects: online experience and offline experience. In terms of online experience, e-commerce platform is committed to improving the convenience of shopping, diversifying the platform, providing clear and accurate product description, customer service, order tracking, etc., thereby improving platform affinity and increasing customer satisfaction. While providing customers with a good online experience, O2O e-commerce for fresh produce also requires a variety of offline experiences. In addition to online offline stores to provide customers with information services, other novel offline experience activities can be carried out to narrow the distance with customers, mobilize the enthusiasm of members, and increase customer trust in the e-commerce platform supply.

5.3 Strengthen the Construction of Distribution Technology Information and Improve the Development Level of Cold Chain Logistics

In order to further improve the economic development level of agricultural products in O2O mode, it is necessary to strengthen the improvement of logistics distribution technology, combine the current situation of e-commerce enterprises and logistics distribution services, and understand the distribution technology to achieve economic security, convenience and efficiency, and consider the adaptation of distribution equipment. Sex, reliability, understanding the choice of scientific and rational allocation and distribution technology and equipment, so that the core technology that suits itself can help to stand in the forest of e-commerce. If the capacity of the self-operated cold chain fleet cannot meet the customer's needs, consider a strategic alliance with a third-party logistics company. At the same time, actively encourage and guide cold chain logistics enterprises to invest in the O2O model of e-commerce development, adjust and improve the cold chain logistics distribution service system, and effectively control the logistics distribution costs while ensuring the quality and safety of agricultural products.

5.4 Production and Sales Direct, Reduce Intermediate Links, Reduce Transportation Costs

Production and sales direct, is a mode of direct supply in the origin, this mode, reducing the transportation process, and the middlemen, not only reduce the transportation cost, but also optimize the quality of the product, in many aspects Advantage. At present, China's production and circulation rates are higher than the sum of the United States and Japan. If we can change this situation, we must reduce the cost of

transportation, and the production and sales are undoubtedly a good way to reduce transportation costs while improving transportation efficiency and reducing the loss of freshness of products. , greatly reducing the cost of production and circulation in China.

6. CONCLUSION

In order for O2O to go longer in China, China must solve some problems, such as the distribution of goods, and the cost is high. If we can't solve the high cost and improve the transportation speed, the area where O2O is used in China will not have long-term development. . Fresh products are mainly fresh, so even if there are many models to choose from, the most important thing is to keep the items fresh in the refrigeration technology.

REFERENCES

[1]Zhou Haiqiong, Zhou Yewang. Research on Logistics Distribution Scheme of Characteristic Agricultural Products in Eastern Hubei. China Business, 2012(31): 193-194.

[2]Ding Ran, Han Wenjing. Discussion on Logistics Distribution Mode and Operation Mechanism of Fresh Agricultural Products in Hebei Province. Logistics Technology, 2011, 30(7): 70-72.

[3]Wang Daoping, Li Feng, Cheng Lei. An Empirical Study on the Agricultural Product Logistics Model in China. Research on Financial and Economic Issues, 2011(02): 109-113.

Research on Methods and Techniques for Maintenance and Repair of Electrical Circuits

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Abstract: China's power industry has achieved very good achievements so far, and its achievements have been highly recognized in the world. Maintenance electrician refers to the personnel involved in the repair, maintenance, commissioning and installation of the circuit and components of the electromechanical equipment system. Electrician maintenance personnel should have a comprehensive and clear understanding of the basic energy saving, indoor and outdoor circuit installation, electrical knowledge and maintenance and installation of various common mechanical equipment in the actual work process. Therefore, the electrician should be proficient in the electrical circuit maintenance skills during the actual operation of the institution, and finally contribute to the process of China's social and economic development.

Keywords: Maintenance electrician; Method and technology; Circuit troubleshooting

1. INTRODUCTION

The development of the power industry is directly related to the development speed and development trend of China's overall economy, and has always been highly valued by the state. The circuit fault repair program, as an important criterion for measuring the functional literacy of maintenance electricians, is also an important part of promoting the development of the national electric power industry [1]. In the trend of continuous diversification and complex development of automated electrical technology and machinery, the maintenance electrician is proposed. High technical requirements, only the people with superb technology and science can ensure the timely resolution of circuit failure [2].

2. MAINTENANCE CIRCUIT FAULTS COMMON IN ELECTRICIAN WORK

2.1 Short Circuit

Short circuit means that the power supply current starts from the positive pole and returns to the negative pole without passing through the electrical equipment, that is, short circuit between various abnormal phases and phases or phase and ground in the system. The main reason is the path with the lowest resistance in the current selection circuit. In the circuit, the power switch is connected in series with the bulb. When the switch is in the closed state, the bulb will be on. When the switch is in the off state, the bulb will be extinguished. If a wire is connected in parallel in this circuit, it will appear. Short circuit. The resistance of the wire is quite zero, and then the wire will short the bulb [3]. When the circuit is short-circuited, the lighting circuit has a large current, and the fuse is quickly blown, so the circuit is immediately cut off. If the fuse is too thick, the wire will be burnt out, and if it is serious, a fire will occur. The main cause of the failure is the damage of the insulation of the lighting circuit, the circuit or grounding of the damaged part, and the short circuit caused by the internal damage of the electrical appliance. Loose internals of the lamp cap may also cause the metal plates to collide and short-circuit each other, and the casing may leak or be repaired. This causes the screw end to fall off and then fall to the ground to cause a short circuit.

2.2 Open Circuit

Open circuit means that the lighting circuit switch is not closed, the wire connection is not correct, or the electrical appliance is burnt out and installed incorrectly, causing the entire lighting circuit to be disconnected at a certain place. When the circuit is cut off, the circuit has no voltage, cannot be illuminated, and the appliance cannot operate. The voltage across the cut-off portion of the circuit is the same as the supply voltage. The main cause of the failure is that the fuse is blown, the wire is broken, the end of the wire is loose, the switch is broken, and sometimes the end of the aluminum wire is severely corroded.

2.3 Leakage

Leakage is caused by the potential difference between the electrical enclosure and the live conductor and ground for some reason. Leakage may be caused by long-term use of lighting lines, insulation aging caused by moisture and pollution.

3. MAINTENACE METHODS AND TECHNIQUES FOR COMMON CIRCUIT FAULTES IN MAINTENANCE ELECTRICIAN WORK

3.1 Empirical Judgment

The method of repairing electrical circuit fault diagnosis mainly judges the scope and location of the fault by "questioning", "listening", "looking", "touching", and "smelling" [4]. Q: Ask the operator about the operation of the equipment before and after the failure. Listen: When the equipment can still run barely, it can be powered on and started to listen to whether there is any abnormal noise. If there is abnormal noise, the abnormal sound should be judged as soon as possible. Look: Check whether the contact

is ablated, melted, whether the wire is loose or loose, the coil is hot, burnt, the melt is melted, the tripper is tripped, the wire connection screw is loose, and other electrical components are burnt out, fever, disconnection, etc. Touch: After cutting off the power supply, touch the parts that are prone to heat, such as coils and contacts, as soon as possible to check if the temperature is normal. Smell: Check for high heat and charred taste.

3.2 Strengthen the Basic Ability of Maintenance

In the process of repairing the fault by the maintenance electrician, it is required to have a wealth of basic theoretical knowledge and continuously accumulate experience in power maintenance. Only when the basic skills are solid, can we ensure the normal development of power maintenance work and enhance the stability of power system maintenance and maintenance. For maintenance electricians, it is necessary to strengthen the basic exercises of maintenance, learn a wealth of theoretical knowledge and hands-on operation in maintenance practice. In addition, experienced maintenance staff should be trained during the drill to continuously enhance their personal overhaul capabilities. Taking the overhaul of large-scale power infrastructure equipment as an example, it is necessary to thoroughly analyze the working principle of the power equipment line, familiarize and understand the sequence and operation of the equipment, and appropriately expand the scope of fault repair while summarizing the equipment theory. After the system observation equipment is debugged, it is calmly analyzed and finally judged. If there is an inaccurate maintenance failure, the maintenance electrician does not respond to emergency or panic, but should stabilize the mood, carefully study the problem of failure, make full use of his own experience to carry out rational judgment, and resolutely cannot blindly ensure the "stable" of fault repair.

3.3 Voltage Detection Technology

Voltage detection class, including two types of step measurement and segmentation measurement. Figure 1 is a schematic diagram of the multimeter voltage measurement. In Figure 1, KM is a multimeter contactor, and SB1 and SB2 are start buttons.

Voltage step measurement, voltage step measurement operation steps: 1 Put the multimeter to 500V AC voltage position, turn off the main circuit and turn on the control single power supply; 2 press the start button, if the multimeter contactor does not suck. If it is combined, it indicates that the control circuit is faulty. In the detection stage, the double operation is performed. The first person uses a multimeter to measure the voltage between 0 and 1 two points. If the voltage between 0 and 1 points is 380V, the control circuit power supply voltage is normal, and then another person keeps pressing the start button. The first person connects to 0 point with a black stick, and then connects the red stick to 4, 3, 2, and 1 points, and performs 4~0, 3~0, 2~0, 1~0. The voltage measurement between points is based on the measurement result to find the fault point. 2. Voltage segmentation measurement, voltage segmentation measurement steps: 1 set the multimeter switch to 500V AC voltage gear, 2 pairs of 0~1 point voltage using a multimeter to measure, if the measurement voltage = 380V is normal; 2 double operation One person presses the SB2 start button in Figure 1 and observes the multimeter. If the state of the KM contactor is not sucked, the control circuit is faulty. The second person uses the red and black multimeter rods once for 1~2 points, 2~ Voltage measurement is performed between 3 points, 3~4 points and 4~0 points, and the fault point is searched based on the measurement result.

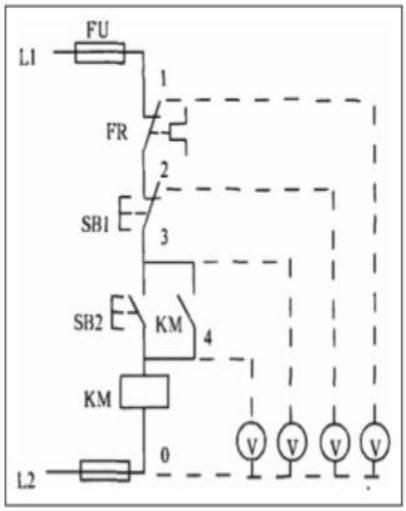

Figure 1 Schematic diagram of multimeter voltage measurement

3.4 Various Troubleshooting Techniques for Common Faults

1). Maintenance technology for short circuit faults. The electrician should first check whether the fuse is intact, the degree of contact is firm, and then check whether the switch is completely closed, whether the four wires of the electric energy meter are loose, and whether the wire on the switch and the fuse box are in poor contact. The short-circuit point should be found in time. In the state of power failure, the circuit block of the multimeter can be used for circuit division check. If only one wire can make the tube bright, it must be disconnected from the live wire connected to the appliance. If both wires can make the tube bright, there must be an open circuit somewhere on the zero line. Remove the fuse at the main switch. Connect the inspection light to the two terminals of the fuse box. If the light is on, there is a short circuit in the circuit. After eliminating the fault point of the short circuit, install a qualified fuse and then send power. If an appliance is used, the fuse will blow immediately, indicating that the total power of the appliance is too high and the fuse is blown. Stop using the appliance immediately and replace it with a fuse of the

appropriate size. Remember to use no wire or wire as a fuse. Once it is short-circuited, the fuse will be less and will cause damage to the appliance. If it is serious, a fire will occur.

2). Overhaul technology for open circuit faults. When all other bulbs on the same lighting circuit are turned on, and only one bulb is not turned on during open circuit maintenance, the circuit is faulty. Fluorescent lamps should be inspected for ballasts and actuators. When all the bulbs on the same lighting circuit are not lit, check if the fuse is blown and if there is a power supply voltage. Use a universal voltmeter to detect the supply voltage. If the voltage is normal, turn the fluorescent light. When the lamp is turned on, if the light is on, the fault point is poor contact between the pin and the lamp holder. If no problems are found in the above checks, replace the ballast. If the fuse is not broken and there is no voltage on the live conductor, check whether the fuse on the upper circuit is broken.

4. CONCLUSION

All in all, the maintenance electrician should master more advanced technology in the actual work process. In the actual work process, we should continue to accumulate experience in maintenance work, and strive to improve our professional skills to a certain extent, innovate and develop new basic maintenance measures, and ultimately play a certain role in promoting the development of public institutions.

REFERENCES

[1]Guo De. Analysis of electrical control circuit troubleshooting for maintenance electrician skill identification. Electronic World, 2017(16): 89-90.

[2]Zheng Jun. On the significance of troubleshooting in electrician maintenance skills. Electronic test, 2018, 389(08): 130-131.

[3]Zhang Huaigang. Common Problems in Circuit Maintenance and Basic Requirements for Maintenance Electrician. Science and Technology Innovation and Application, 2017(17): 184.

[4]Wang Junfeng. Electrical maintenance of a pass. Machinery Industry Press, 2011.

Research on the Influencing Factors of Consumer Purchase Behavior Based on Network Second-hand Transaction

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Abstract: With the continuous development of Internet economy, in recent years, the transaction of second-hand goods in China is no longer limited to offline, has gradually transferred to the line, and the rapid rise of network second-hand trading platform. By studying the positive and negative influencing factors of consumers shopping in second-hand trading platform, we can understand their purchasing behavior and promote the development of online second-hand trading.
Keywords: Influencing factors; Second-hand trading platform; Purchasing behavior

1. INTRODUCTION

In developed countries in Europe and the United States, the secondary market started early and became one of the indispensable channels for people's consumption. The flea market is a typical example. In China, although the second-hand market started relatively late, in recent years, with the rapid development of the sharing economy, Xianyu, Zhuanzhuan and other second-hand trading platforms have also developed very rapidly. These platforms are mainly between consumers. Compared with Taobao, Tmall, Jingdong and other platforms, the webpage design should be exquisite, the product description should be detailed, and the product types should be rich and varied. The interior page design of the second-hand trading platforms is relatively simple. This paper will explore why customers are buying in these second-hand websites, and what factors are mainly considered in the purchase process [2].

2. CONSUMER BEHAVIOR RESEARCH

In the process of purchasing goods, the marketing circle generally thinks that it is divided into five stages: problem identification, information collection, scheme evaluation, purchase decision and post-purchase behavior, which are divided into pre-purchase, middle-purchase and post-purchase behavior. We can analyze the consumer undefined purchase behavior in the second-hand trading platform from these three aspects. Before the consumer buys, in order to buy the right product, it is necessary to carry on the demand analysis to form the cognition and belief to the commodity, and then form the preference and emotion to the commodity in the process of information collection and scheme evaluation, and then the purchase behavior will occur. After the purchase behavior, the consumer enters the process of consumption of the purchased product, mainly whether or not to consume, when, where and how to consume. After consumption, the customer compares the expectation before purchase with the effect after consumption. If the effect after purchase is consistent or the effect after use exceeds expectations, the consumer can generally produce better emotion, and then the repurchase behavior may occur. Otherwise there will be no repurchase behavior, or even criticism, complaints.

From the three stages of consumer consumption, preference is mainly formed before purchase. If there is a positive impact, the customer will prepare for the purchase behavior. If there is a negative impact, the customer will hesitate and form a certain emotion, which will affect the purchase behavior. When the product is consumed, there will be post-purchase evaluation, which will lay the foundation for the next purchase behavior.

3. ANALYSIS OF THE POSITIVE INFLUENCE FACTORS OF THE SHOPPING IN THE SECOND-HAND WEBSITE

(1) The price factor-The price of the commodity in the second-hand websites is generally lower

The price of the commodity in the second-hand website is generally lower than the price of the commodity in the general shopping website, and the price is generally only 1/2 or even 1/3, the setting of the price is mainly related to the quality of the commodity, the better the commodity price is higher, But the price is still lower than the price in the general shopping website. Many consumer who uses the commodity for a short time may prefer to select the goods in the second-hand website, so can save more cost.

(2) The channel factor-Consumers can buy goods that cannot be reached in other channels

The product sold by the seller in some second-hand website is self-made, rarely sold in the market, or purchased in other channels. When the consumer needs the relevant product and cannot obtain through other channels, they may search the second-hand website for the relevant product, thus causing the purchase behavior. In addition, take Xianyu as an example, there is a section in the website is "star good

things," many stars will publish their own idle items, and fans will buy their favorite star items, for fans, these items are not available in other sites, and Xianyu has become the only channel for fans to obtain star items.

(3) The perceptual factor-obtain the real consumption feeling of the seller, so as to get a certain sense of security

From the current data, the main reason for the seller to resell the product is that the seller has completed the consumption of the product and does not need to continue to use it. In order to reduce the accumulation of idle items, and properly produce certain benefits, the product will be resold [1]. In order to sell products better, improve the turnover speed of their products, sellers will take the initiative to introduce the relevant feelings, as well as the reasons for the second resale. Consumers in the process of browsing, with Taobao, Tmall in some praise is that sellers use red envelope coupons to attract consumers to evaluate differently, while obtaining the relevant information of the product, also understand the use of the product effect, feeling and other more real experience.

(4) The information factor-timely access to get the information on items of interest

In order to promote the circulation of platform information, Xianyu opens a reminder function. When consumers browse or collect products, they will actively remind customers to enter the website or APP software to view the relevant information, so as to help customers obtain the information of interested goods in time and enhance their desire to buy.

(5) The security factors-the security of the second-hand trading platform

Taking Xianyu as an example. it establishes an online second-hand trading platform for consumers in the form of an intermediary, and restricts the behavior of sellers by sharing the credit system with Taobao. It can reduce the risk in the transaction and ensure the capital security of the buyer through Alipay tripartite guarantee payment. In addition, Xianyu also set up a complaint mechanism. When a transaction dispute occurs, the problem is solved by representations and a small court is set up to allow the buyer and the seller assume that they are in a certain dispute environment. Better avoidance the possible risks.

4. ANALYSIS OF THE NEGATIVE INFLUENCE FACTORS OF THE SHOPPING IN THE SECOND-HAND WEBSITE

(1) Impact of authenticity

Among these second-hand websites, many sellers have actually purchased and used the products they sell, and hope to reduce their losses through resale through the website， but does not exclude the presence of a small number of the seller false propaganda, selling the goods that are not present in the website, or the quality of the product does not conform to the content described in the web page. As the buyers who are not possible to determine whether the goods in the website comply with the description, whether there is likely of a property loss, thereby affecting the consumer purchase.

(2) The impact of the shopping experience

Taking Xianyu as an example, most of the second-hand websites are mainly individual sellers. Their service level and response speed are far less than the platforms such as Taobao and Jingdong. Many sellers even make a clear indication in the personal web page that they are not on-line in real time, so the customers can purchase the products on their own. Consumers who have been accustomed to fast customer service responses, when shopping on these platforms, have to take longer time to wait for the sellers' replying. This will impact customers who wish to be quick to respond, with faster shopping speed. In addition, the description of the commodity in the second-hand website is far less than the general shopping platform, mainly in a simple and clear way, the product inner page of many sellers is only a simple few words, few figures. For customers who are used to rich pages, exquisite product drawings and detailed product description, the shopping experience can be reduced.

(3) Effect of product guarantee

In that second-hand website, most of the goods are actually used by the seller and are indeed idle. However, there are also a small number of false descriptions of the seller, which provide goods with quality problems, or false products, invisible defective goods, or even the false shipment and the fraud. As well as the existence of problems after the completion of the transaction, it is impossible to carry out the after-sales situation, etc. Many consumers will worry about how to guarantee their rights and interests after the shopping on the second-hand website, and then give up the purchase [3].

5. CONCLUSION

Second-hand websites are still relatively new in China, so by analyzing the purchasing behavior of consumers in second-hand websites, and analyzing the positive and negative factors that affect consumers' shopping in second-hand websites will be conducive to promote the standardized development of second-hand websites.

REFERENCES

[1]Qinlu Zhou. Research on Consumer's Online Resale Behavior. China Market, 2018, 5.

[2] Ruijuan Wu .Study on the Impact of Sunk Cost Saving Consumption View and Control Motivation on Active Consumption Behavior. Nankai Business Review, 2012, 15.

[3]Milembe Salum Nkonya. Factors Affecting Consumer Buying Behavior. Shandong University, 2018.

Research on the Role of Environmental Design Teachers under the Background of "Internet + Education"

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Abstract: With the advent of "Internet +" era, profound changes have taken place in the field of education. The change of information transmission mode and information quantity is constantly rewriting the connotation of teachers' profession. Based on the deep analysis of "Internet + education" background environment design specialty teaching characteristics and the environmental design of teaching and learning times change, on the basis of the "Internet + education under the background of environmental design" summarized the role of professional teachers, reshape the Internet + education under the background of environmental design major connotation of the role of teacher.

Keywords: Internet + education; Educational wisdom; The role of teachers

1. INTRODUCTION

"Internet + education" is a new form of education combining Internet technology and education with the continuous development of modern science and technology. Internet + education "under the background of institutions of higher learning environment design professional teaching model not only refers to the" Internet ", "Internet + learning teaching", but in the field of Internet + education, make the traditional education process to constantly adapt to the Internet, using the Internet to view education, thinking is the teachers and students in the Internet under the support of information technology in use of Internet resources, produce a new type of intelligent teaching mode, its essence is to comprehensive promoting the modernization of education, through the Internet to deliver high quality teaching resources, to achieve each student's individualized learning, promote students comprehensive and free development, So as to cultivate application-oriented professionals with solid professional foundation and strong innovation ability [1].

2. THE TEACHING CHARACTERISTICS OF "INTERNET+ EDUCATION" BACKGROUND ENVIRONMENT DESIGN MAJOR

2.1 Professional Resource Sharing

"Internet + education" is no longer a simple technology + education. Instead, it allows education to constantly adapt to the Internet. Internet + education provides flexible and high-quality learning resources for people's professional fields, thematic learning or problem solving, so that more people can share knowledge and become a possibility. Students are not exposed to time, space, schools or specialties. The limitation of study and semester, according to their professional level, use the Internet thinking to choose their favorite courses, it allows teachers and students to participate in the use of Internet resources, no matter in any corner of the world, as long as you open the network, you can accept the world's best teachers to teach the best lessons.

2.2 Individualization of Professional Education

Under the background of "internet + education", the teaching mode tends to be more and more digital. Big data and automated teaching system make personalized teaching possible. Internet education uses computer-specific database management technology, which provides a feasible path for the realization of personalized teaching. "Internet + Education" provides students with optional learning content, learning channels and more resource links, and learners can choose the content of interest to learn according to their own needs.

The computer system makes a complete track, record and analysis of the students' professional learning, and then summarizes the learning characteristics and learning rules of each student. Then, according to these rules, the learning software system will recommend the professional courses and learning plans suitable for the students, so as to truly "teach students according to their aptitude".

2.3 The Innovation Driving Capacity of Professional Education has been Enhanced

"Internet + education" embodies the idea of using the Internet to innovate the whole and part of education, so as to make qualitative changes in education and achieve a level leap [2]. First, we should strengthen the support of technology for educational innovation. Provide students with innovative learning and entrepreneurship test platform. At present, in all kinds of schools at all levels, which are ahead of the reform and development, the space for creation is springing up in a large number, and it has become a scenic line for the modernization of education. Third, the formation of open-sharing innovation. Internet technology provides convenience and possibility for the opening and sharing of innovation. The innovative ideas and ideas of educational subjects are innovative

collaboration and integration through the Internet, so that participants can share achievements and innovative points of education and teaching can rapidly spread to the line and surface of innovation.

3. "INTERNET + EDUCATION" REFORM OF TEACHI2NG AND LEARNING FOR BACKGROUND DESIGN MAJORS

3.1 Reform of professional teaching resources

Under the background of "Internet + education", the Internet platform brings together the learning resources of many colleges and universities in various regions, so that teaching resources can be shared on a wider scale on the Internet platform. The ways for students to acquire knowledge are fixed textbooks and teachers' imparting and developing into using the platform of network professional teaching resources, flexibly choosing and learning high-quality curriculum resources. At the same time, we should change "teacher-centered" to "student-centered" and attach importance to the guiding role of teachers. For example, teachers can carry out online questions answering, discussion, case analysis, etc. and establish a network learning community, so as to make teaching resources from small-scale use to large-scale sharing.

3.2 Reform of Professional Teaching Method

Current teaching courses, learning content and process of environmental art design specialty are all decided by colleges in advance. The system and content of professional teaching courses are highly structured and assimilated. In the era of "Internet plus", with the support of network technology and online teaching platform, not only network based curriculum resources have been generated, but more importantly, it has made great changes in the whole school curriculum, from organizational structure to basic content. With the support of the Internet, in addition to the innovation of compulsory courses and contents, more and more schools have offered elective courses with their own characteristics, which provides a better basis for the realization of quality education. In addition to utilizing the open courses and resources in the network, universities also open their own courses through the network, allowing learners to learn their courses through the network, fully reflecting the interconnection and resource sharing.

Therefore, under the background of "Internet + education", teachers should actively change teaching concepts and methods, and use information technology to promote the all-round development of students. Because in the era of "Internet +", teaching methods tend to be digitalized, and traditional teaching methods can no longer meet the development requirements of "Internet +" education.

4. THE ROLE OF ENVIRONMENTAL DESIGN TEACHERS UNDER THE BACKGROUND OF "INTERNET + EDUCATION"

4.1 Teachers' Teaching Role has been Reversed and Strengthened.

With the continuous progress of Internet technology and information technology, the traditional teaching methods can not meet today's teaching needs. Advanced technology can pay more attention to each individual student, the presentation of learning content is more diversified, more in line with the needs of students of different professional levels. In order to meet the requirements of the development of the times, teachers' teaching methods should change with the development of teaching technology. According to different teaching contents, teachers should adopt different teaching methods. Teaching mode, design diversified teaching activities. The roles and roles of teachers and students will also undergo profound changes. Students' subjective status and creativity will be more fully reflected, and learning methods will be more individualized and subtle, making learning ubiquitous and omnipotent. Teachers are mainly instructors and guides, and they are the caregivers and Enlightenments of students' lives. For example, teachers can integrate formal learning with informal learning, and put distance teaching and online discussion into practical teaching.

4.2 Teachers have Changed from Lecturers to Knowledge Leaders, Learning Designers and Question-answerers.

Under the background of "Internet + Education", the task of teachers is to help students learn and serve them. Firstly, teachers should start from the differences of students, and make different teaching plans and plans according to different students' cognitive level, learning ability, learning style and learning interest, and constantly adjust them. Secondly, under the background of "internet + education", teachers can create more open learning situations so that students can truly learn in research and practice and improve their ability to solve problems. Finally, teachers should make effective use of information technology to provide differentiated teaching resources that meet students' characteristics and promote students' personalized development. 。In differentiated teaching, help students choose their favorite courses according to their interests, and make every effort to promote the development of each student at the original level, so that students can become more self-reliant learners [3-4]. Teachers should design teaching videos and learning resources in advance. The process of making and searching for resources is also a process of thinking about teaching content. Invisibly, teachers become students' companions, and then become tutors in the classroom. Students become the center of learning and the real manipulator of knowledge. They take the initiative to learn the video clips condensed by teachers in time before class, and build their own knowledge system by completing real tasks in practical activities.

4.3 Teachers Become "Analysts" Who Understand Students' Professional Learning Needs Best

In the "Internet + education" stage, the role of big

data and multimedia technology in teaching is not to create a unified, standardized teaching process, but to collect students' learning needs accurately by collecting abundant data in the learning process, and to understand the students' cognitive state and analysis by means of big data and other new technologies. Students' learning characteristics, assessment of students' potential advantages and the best way of learning, to provide tailor-made learning support for each student.

4.4 Teachers with Higher Professional Education Wisdom Can Cultivate Innovative Talents Creatively

To cultivate innovative talents, teachers' creativity is particularly important. Therefore, teachers' teaching wisdom should pay more attention to the future and the unknown world, understand how to use educational technology to dialectically deal with the relationship between "technology" and "people", highlight the awakening of innovative consciousness, the continuation of innovative enthusiasm, the guidance of innovative practice, the achievement of innovative goals and the evaluation of innovative achievements, so as to promote students' various abilities. The development of innovation ability. Under the background of Internet + education, teachers know how to use information technology reasonably and appropriately to promote the development of students, improve the quality of education and teaching, and solve the problems of teaching, giving full play to the wisdom of the users. When using information technology supported by Internet, teachers should also use it creatively and flexibly, such as turning over the classroom creatively, cutting into the core knowledge of the subject creatively, explaining the understanding of things creatively, throwing out questions creatively and so on, and according to the theory of multiple intelligences, in classroom teaching, teachers should also use it creatively and flexibly. We should emphasize the diversity of instructional design and realize the development of students' wisdom and creativity by seeking the entry points of different intelligences. At the same time, instructional design should include various creative and complex learning tasks, so that students' brains are always in a highly positive state. The purpose is to make teaching more creative, to make teaching more intelligent and flexible, so as to better train creative talents.

Therefore, the change of roles between teachers and students will change the main body of the classroom. Although students are the main body, teachers should take into account the methods of students' rapid internalization of knowledge and guide students to learn independently. Teachers should teach students to make clear the individual's course in the ocean of information, master the strategy of avoiding danger, sail with reasonable help of external forces and self-confidence. Activity [5]. So whatever "Internet + education" development, teachers' role will be further strengthened, under the background of "Internet + education", the environmental design of professional teachers will have a higher professional education wisdom, from become the leading of knowledge teaching, with the aid of new technology such as large data, understand the students' cognitive state, for each student to provide tailored learning support, make the teaching more intelligent clever breath, to better cultivate creative talents.

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REFERENCES

[1]J .song plenary session "Internet + education": value, significance and coping strategies. Journal of kaifeng institute of education, 2017(5).

[2]J .sun kwanning's crisis and response to teacher professional development in the era of "Internet +"; Educational research, 2016(6).

[3]J. su youbonlan, xiaoli, qiu chengxiang. Challenges and coping strategies faced by front-line teachers in frontier universities in the MOOC era. Journal of Dali university, 2016, 1(6).

[4]J. jing zaiping. Challenges and coping strategies faced by ideological and political theory teachers in the era of new media. Journal of mianyang normal university, 2017, 36(12).

[5]J .sun huiyan, hao yuqing. Challenges faced by the ruling party's political ecology in the Internet era and its responses. Exploration, 2017(1).

The preferable database model in china under Chinese IP system

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Abstract: Due to the lack of special legislation, the court usually invokes the basic principles of civil law and the anti-unfair competition law to protect the database. In the following, the author has selected several legal protection models with high probability of time to explore, in the hope of finding the best model for protecting the database under the Chinese intellectual property system.
Keywords: Database protection; Originality; Intellectual property law; Neighboring-right

1. THE EXISTING LEGISLATION AND JUDICIAL CASES THAT PROTECT THE DATABASE IN CHINA

1.1 Relevant Provisions of China's Copyright Law

After the Copyright Law was amended in 2001, (Article 14 was amended to read: "Compilation of a number of works, pieces of works, or data or other materials that do not constitute a work, the selection or arrangement of its contents reflects the originality of the work, the compilation of the work, its copyright It is enjoyed by the assembler, but the copyright of the original work must not be infringed when the copyright is exercised.) the Chinese database and the foreign database are in the same position, and the copyright protection level provided by the copyright law of China is in line with the international community. It can be seen that the database protection model adopted by China's "Copyright Law" is consistent with the protection model of the Berne Convention, the TRIPS Agreement and the WIPO Copyright Convention. The use of copyright law to protect original databases is not original. The database without originality is not protected [1].

1.2 Relevant Provisions of China's Anti-unfair Competition law

We can use the provisions of article 2 of the act against unfair competition to protect the database that enters the market circulation. There is no special legislation on database protection in China. In judicial practice, commercial databases are often considered to be protected according to the anti-unfair competition law (especially non-original databases). Thesunshine company v. Shanghai talent agency is a typical case of successfully applying the anti-unfair competition law to protect the database. According to the principle of good faith in the law against unfair competition, the judge ruled that the defendant's illegal theft of database and profit-making transfer constituted unfair competition. Plaintiff sunshine company in the production of the database to pay a lot of investment and bear a huge risk of investment, the legitimate rights and interests arising therefrom should be protected by law. The case of "proposed and under construction projects in China" exposes the problem of using anti-unfair competition law to protect the database [2].

1.3 The Protection of the Basic Pprinciples of Civil Law

In the absence of a legal provision specifically for non-original databases, the court will consider protecting the rights of database makers on the basis of civil law principles. However, the law does not stipulate that database is a kind of property right, which will inevitably lead to the discretion of individual judgment in the process of judgment, and the identification and protection of database are uncertain. For example, in 1991, Guangxi radio & TV news agency sued Guangxi coal mine workers' news agency for infringement of TV program schedule [3].

In summary, in the absence of special legislation to grant exclusive rights to the database, in practice, it will take the lead in considering the protection of the database according to the Copyright Law, but the database that can be considered to have originality constitutes a compilation is limited, so often rely on the principles of civil law and Anti-unfair competition law theory. However, this approach has its drawbacks. The author has selected several legal protection models with higher practical possibilities to explore in the following, in the hope of finding a model to protect the database under the Chinese intellectual property system [4].

2. FOREIGN LEGISLATION STATUS AND MODEL CAN BE USED FOR REFERENCE

2.1 An Independent Legislative Model Represented by the United Kingdom - A System of Special Pprotection Rights

The special rights protection model represented by the EU is an extraterritorial representative rights protection model, and its core is to create a database right for non-originality databases. The object of special rights protection is mainly a database that does not constitute a compilation of works, and the database that can constitute a compilation of works is naturally protected by copyright law [5].

Special rights protection protects both original and non-original databases. If the selection and

arrangement of the database meet the "originality" standard, the database will be protected by copyright. If the database itself cannot meet the requirements of originality, special rights protection shall be applied to it. Database special rights protect both electronic and non-electronic databases [6-7].

2.2 German Model

In the process of implementing the EU database directive, Germany did not introduce new legislation to other EU member states. Instead, it revised the existing copyright law and incorporated database protection into the existing copyright law system. For databases that meet the "originality" standards, they are protected by copyright according to law; for databases that cannot meet the "originality" standards, because they embody the labor of database rights holders, they create an independent way of neighboring rights. Property rights, which are protected by neighboring rights.

2.3 American Model

The protection of the database in the United States is different from the special rights protection model of the EU Directive. It has not succeeded in the path of information property, but adopted the anti-unfair competition model under the concept of tort law.

After a series of bills transplanting the EU Directive in the United States was devastated by Waterloo, the introduction of H.R. 3261 Act 2 meant that the United States adopted a protection model against unfair competition law under the path of information property.

This model has its drawbacks. First, the law does not clarify the type of database rights. Therefore, the specific connotation and protection of database protection can only be reflected in specific judicial precedents. Secondly, anti-unfair competition itself is the regulation of a competitive business entity. It cannot effectively solve the problem of non-competitive subjects' infringement on the database, and the scope and intensity of protection are limited. Furthermore, the limitation of the period of protection of database rights is replaced by the statute of limitations, and there is a suspicion of information monopoly in the long run.

3. THE MODEL PROBABLY BEST SUITED TO THE CHINESE

Many scholars in the theoretical circle have also conducted in-depth discussions on what database protection model is adopted in China. Some scholars advocate adopting the independent legislative model of EU legislation and granting special rights to database producers. At the same time, the provisions on the compilation of works in the Copyright Law should be included in the database protection law to avoid conflicts with the provisions of the Copyright Law. Some scholars believe that the anti-unfair competition law can be combined with the contract law to protect the database without the need to create special rights separately. Some scholars believe that the anti-unfair competition law can be combined with the copyright law to protect Database, using copyright law to protect original database, using unfair competition law to protect the content of the database, to some extent to make up for the lack of copyright law protection, to protect the input of database producers; some scholars It is argued that China should give the database a limited exclusive right to protect it. It is suggested that China should increase the database protection regulations under the current copyright law to achieve the exclusive protection of the database; Some scholars believe that the copyright law should be improved. The main legal protection system cooperates with the legal system such as the anti-unfair competition law, and the non-original database is protected by the neighboring rights to achieve reasonable protection of the database. In the previous article, the author has carried out detailed argumentation on various protection methods of the database. After careful weighing, the author tends to protect the database by two-tier protection scheme by perfecting the existing copyright legal system in China, Using copyright to protect the database with originality, while using neighboring rights to protect the database without originality ,the specific reasons are as follows ;

First, the use of neighboring rights to protect the interests of database producers is in line with the original intention of the establishment of the neighboring rights system. Neighboring-right, also known as communicator's right, means the right to be adjacent to copyright, set to encourage the spread of the work and protect the interests of the propagator. The protection of neighboring rights in legal form was first seen in the 1936 Austrian Copyright Law. Legislators at the time considered that in the cultural field, there is also a labor outcome should also be protected except for the author's creative work. This type of labor co-author's work is different in nature, but it is closely related to the dissemination of the work. Therefore, the protection of such work achievement is also related to copyright protection. In the final analysis, the database is a huge "information memory". Most database-right holders spend their energy to collect all kinds of data and information into the database. It is not for their own use. The real purpose is to trade the database, realize the business value of the database, recover investment costs and gain benefits. In the process, the database owner actually plays the role of "information communicator". Although not all information can meet the standards of works, the rapid development of society has caused new changes in the object of intellectual property. The object of neighboring rights should not be limited to works, but should be developed along with the development of communication technology. For development, we should look at the right of neighboring from an open perspective and look at the "information communicator rights" of database

producers. Therefore, the author believes that the use of neighboring rights to protect the interests of database producers, in line with the original intention of the establishment of neighboring rights

Second, the right of neighboring effectively balances the interests of database producers and the interests of the public. The protection of neighboring rights is the communication behavior of the communicator, and does not involve the content of its dissemination. As far as the database is concerned, the right of neighboring limits the scope of the rights of the producer of the database to a specific database. The producer of the database can only stop the illegal use of information in a specific database, and cannot interfere with the acquisition by others from other legal channels. The contents of this library are the same. Some scholars have worried that special rights may easily cause database producers to monopolize public information and harm public interests. The neighboring rights system has solved this contradiction very well. Neighboring rights make the database system authors only get paid according to their own communication behavior, but can not monopolize the database content.

Third, neighboring rights avoid the originality of the database. Neighboring rights are a kind of communicator's right, and the act of protecting the right person's dissemination of information is the technical, artistic and organizational input of the communicator. Access to neighboring rights protection does not require the originality of the database, and we do not need or need to consider "originality standards". If the communication behavior is original, it falls into the scope of copyright and can obtain the dual protection of copyright and neighboring rights.

Fourth, the use of the system of neighboring rights to protect the interests of database producers is conducive to maintaining the stability of the existing legal system. China's existing copyright law system has a relatively mature interest balance mechanism, giving authors the right to copyright and the propagator's neighboring rights. At the same time, the system stipulates the restriction of rights. While protecting the rights of authors, it encourages the dissemination of works and effectively promotes culture. The prosperity of the industry is the purpose and pursuit of database intellectual property protection. The law should aim at the development of society. Blindly advanced legislation will affect the stability of the legal system and become a hindrance to social development.

Fifth, using the neighboring rights system to protect the database can reduce the cost of legislation. Although on the whole, the revision of the law is always lagging behind the development of science and technology, as long as the new situation and new problems brought about by the development of science and technology can find a solution within the framework of the existing legal rules, it means that There are still legal systems and systems that are in line with the development direction of new technologies. The use of the existing neighboring rights system can meet the needs of database legal protection with a small legal cost, and is also conducive to maintaining the stability of China's legal system.

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REFERENCES

[1]Wu Handong. Intellectual Property Law. Beijing: Peking University Press, 2012(51).

[2]LiuQing. New Progress in Database Legal. Protection and China's Countermeasures, 2006, JI (4).

[3]Li Yang. Research on database legal protection. Beijing: China university of political science and law press, 2004: 312.

[4]Li Yang. On the Legal Protection of Databases, 2002, LR (1).

[5]Shen Yanxia. On the Legal Protection Model of Databases, 2007, LSS (6).

[6]Sun Jian. Luo Dongchuan. Analysis of Intellectual Property Cases. Beijing: China Legal Publishing House, 1998: 255-256.

[7]Qin Wei. On the protection of special rights of databases, 2001, MLIT (6)

On the English Translation of *Song of a Pipa Player* from the Perspective of Three Beauties Principle

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Abstract: Poetry is a unique literary art. Poetry translation, as a bridge of intercultural communication, plays an important role in transmitting the aesthetic beauty and the ideas of the original poem. Bai Juyi's poetry is a product in the specific historical period with particular characteristics. Bai's poetry illustrates the beauty of sound, form, and sense of Chinese classical poetry, which requires that the English translation of classical poetry should not only follow the meaning of the original text faithfully and smoothly, but also convey the poetic imagery beauty of the original poetry. On the basis of the previous English translation studies on classical Chinese poetry, this thesis conducts the qualitative analysis of Xu Yuanchong's English translation of Bai's *Song of a Pipa Player* from the perspective of the "Three Beauties" Theory. According to the characteristics of *Song of a Pipa Player* in the aspects of sound, form and sense, this thesis analyzes how Xu presents the beauty of sound, form, and sense of the original poem in the translation process from the perspective of translation aesthetics, which indicates that the "Three Beauties" Theory has a clear guiding significance and great theoretical contribution to the English translation practice of Chinese classical poetry.
Keywords: the "Three Beauties" Theory; *Song of a Pipa Player*; Poetry translation

1. INTRODUCTION

With its long history and profound culture, China is gradually entering into the center of the world in the well-rounded aspects. Poetry, a unique form of language, has its ingenious literature style expressing the culture and society of a nation. Poetry translation plays an increasingly important role in the dissemination of the various cultures of China, which facilitates the cultural transmission and benefits China and the whole world. Translating Chinese poems into other languages is not only regarded as the process of Chinese literature going to the world, but also the necessary way of developing Chinese culture itself.

Bai's poetry occupies an important position in Chinese poetry history. Bai's personality and characters are vividly shown in his poems, and the charm of Bai's poems is mainly derived from the originality of the images. Although the English translation of Bai's poems has a history of decades, the related research has not been focused continuously, which leads to the fact that it has not been a major breakthrough in the field, and has not been rooted deeply and theoretically. Although some Chinese scholars touch the related research, it is still in the initial stage with lacking systematisms, comprehensiveness and profundity.

When it comes to the translation of poems, Xu Yuanchong cannot be neglected because of his outstanding contributions to this field. His supereminence in poem translation field is not only attributed to his rich and beautiful translation works, but also because of his outstanding contribution to translation theory. [1] Most of his translation theories and principles come from his rich translation practice. His ideas on literary translation, especially on poetry translation, have made great repercussions in the translation field, of which the most important is the "Three Beauties" theory which gains the most popular theory in poem translation. Professor Xu Yuanchong is the expert in English translation of ancient Chinese poetry. He advocated in the translation theory of "Three Beauties" that the original poetry should be kept and transmitted from the three levels of sense, sound and form. The theory of "Three Beauties" has made a very important contribution to poetry translation studies.

2. LITERATURE REVIEW

Chinese poem translation has been emphasized for a long time since China has launched the reform and opening up policy, which is regarded as the symbol of the development and prosperity of Chinese culture. However, the related research on poem translation has been paid less attention than the poem translation itself, even though the scholars are gradually realizing this situation and trying to do more studies in this field. [2]According to the research contents, the related studies are mainly categorized into four aspects: poem translation practice, poem translation theory, the research on poem translation versions, and the research on translators.

As for the research on poem translation practice, many scholars focus on the ideas about how to translate Chinese poems, and what kind of skills should be involved to poem translation. In details, different dimensions are emphasized by different scholars on poem translation. For instance, Gao (2017)

emphasizes the cultural factors which influences the translation qualities, and in the research poem translation is regarded as the way of communication between different cultures, in which the relevance theory is introduced to the poem translation to deal with the cultural influences on poem translation. [3] Li (2009) carry out the study on the ideology that takes effects in translating poems to deliberate that poem translation is not only about the exchange of different languages, and not about being confined to the words themselves, but also about the macroscopical context in which the outside factors, such as the ideology of the author, should be taken into consideration when doing poem translation. And some scholars are still having the argument about whether the poems can be translated or not. However, the mainstream about this is holding the viewpoint that although it is difficult to translate Chinese poems into other languages considering the culture, history, and traditions, Chinese poem translation is still possible, which needs a tough journey to go.

As to the poem translation theory, the related translation theories and ideas are flourishing dramatically. Chinese poem translation is deeply affected by the translation theories put forward abroad. For example, Nida's functional equivalence theory is one of the most popular translation theories adopted in Chinese poem translation. There is another translation theory which is also popular in poem translation theory in China, namely, domestication and foreignization theory that is put forward by Lawrence Venuti (1995). Zheng (2014) analyzes the translation strategies of Du Fu's poetry from the perspective of domestication and foreignization theory. [4]In the research, the author suggests that compared with the western countries, Chinese culture and literature are not that strong nowadays, so the translators should be encouraged more to adopt foreignization strategy to translate Chinese poems into other languages. There are still other scholars trying to propose another theoretical perspectives to Chinese poem translation, such as ecological translation, reception aesthetics theory, and so on.

All the previous studies reviewed above illustrates the fact that the research on the English translation of Chinese poems are gradually flourishing during the recent decades. However, the related translation theory developed or created by Chinese translators are not paid more attention than those abroad. Generated and nourished by the development of Chinese economy, culture, and society, Chinese translation theory owns its unique merits in doing the research on the English translations of Chinese poems. To enhance and enrich the study of English translation of Chinese poems under the help of Chinese translation theory, this thesis mainly adopts Xu Yuanchong's "three beauties" theory to analyze Xu's English translation of Bai's landscape poems to justify the application of "Three Beauties" theory in Bai's poems and try to provide the applicable strategies of Chinese poetry translation.

3. THEORETICAL FOUNDATION

Since the birth of Xu Yuanchong's "Three Beauties" theory, the comprehensive changes have taken place in carrying out the analysis of poem translation. This part deliberates the theoretical foundation of this thesis with the brief introduction to Xu Yuanchong.

3.1 A Brief Introduction to Xu Yuanchong

Professor Xu Yuanchong is outstanding in the translation field because of his rich and beautiful translation works, and his prominent contribution to translation theory. Most of his translation theories come from his rich translation practice. For literary translation, especially in poetry translation, his ideas have made great repercussions in the translation field, of which the most important is the "three beauties" theory. On the basis of the "three beauties" theory, Xu Yuanchong also put forward the theory of "superiority" and "competition theory". His achievements in translation practice are also obvious to all. He translated the world masterpieces such as "Reminiscence", "John Christoph", "Red and Black" and "Mrs. Bovary" into Chinese, and translated "the Book of Songs", "Chu Ci", "Romance of the Western Chamber" and "Three Hundred Tang Poems" into English or French. [5] Indeed, Mr. Xu has achieved remarkable achievements both in translation practice and in translation theory.

3.2 "Three Beauties" Theory

The "Three Beauties" theory refers to the beauty of sense, the beauty of form and the beauty of sound. The "Three Beauties" theory is inspired by Lu Xun about how to write articles. However, Mr. Xu applies this theory to literary translation. According to Xu, when translating poems, the beauty of sound and form should be concerned as much as possible without breaking the beauty of sense. Then in "Journal of Foreign Languages", Xu added the relationship between the "Three Beauties". The beauty of sense is the most important factor, the beauty of sound is the secondary, and the beauty of form follows them, which means the beauty of sound should be pursued as much as possible without breaking the beauty of sense, and the beauty of form should be improved as much as possible on the conditions of pursuing the beauty of sense and sound (Xu, 1979). [6]Those three beauties are indispensable. Mr. Xu actively advocates the use of the "Three Beauties" theory to guide the translation of poetry, and to carry out his translation standards in the practice of translation.

With regard to the beauty of sense, Mr. Xu explained that the historical factors or associative factors are usually involved in dealing with the beauty of sense. When translating the poems into another language, without the similarly historical and associative experiences, it is not easy to convey the sense beauty of the original poem. Therefore, when translating the meaning of the original poems, it is not only to

express the meanings of its surface, but also to express its underlying meanings. In translation, the proper words in meaning should be chosen in the target language to meet with the sense of beauty in source language, and sometimes the beauty of sense can be realized by the sense of form and sound.

Regarding the beauty of form, Xu Yuanchong believes that this is mainly in terms of the length and the integrity of the poem. [7] In his "Art of Translation" and many other papers on translation studies, Mr. Xu has repeatedly emphasized the importance of the beauty of form combining with the different rhyme patterns, which indicates his insistence that the structural factors should be paid more attention when doing translation. Mr. Xu also insists that length and symmetry should be included when dealing with the beauty of form. Generally speaking, it is difficult to follow the similar structure from source language when doing the translation to meet with the beauty of forms in target language. However, Xu has never been afraid of overcoming the difficulties, and has been brave to try and translate countless outstanding works. As for the beauty of sound, the different rhyme patterns can be deployed according to the common usage of target language to meet with the source language, in which the rhymes in target language can be correspondingly chosen according to the rhymes in source language. Reduplication, repetition, and alliteration can be also employed to accomplish the beauty of sound. Mr. Xu is also very concerned about rhymes. Chinese ancient poetry is very strict in tone, rhyme and number of sentences, just like dancing with handcuffs and fetters. In his translation, he put on the "handcuffs and fetters", trying to make the translation with strict rhythm, sound step and number of sentences, so that the translation had the same harmony and aesthetic feeling as the original.

4. ANALYSIS OF THE TRANSLATION OF *SONG OF A PIPA PLAYER* FROM "THREE BEAUTIES" THEORY

The previous parts of this thesis have been deliberated the literature review of the English translation of Chinese poems, the features of Bai's poems, and the theoretical framework of Xu's "Three Beauties" Theory. This part conducts the specific analysis of the Xu Yuanchong's English translation of *Song of a Pipa Player* from "Three Beauties" Theory with taking the concrete examples to illustrate the justification of the employment of the "three beauties" when translating *Song of a Pipa Player*.

4.1 Analysis from the Beauty of Sense

According to the "Three Beauties" Theory, the beauty of sense involves dealing with the connotative meaning of a poem. The underlying meaning of a poem should be put into the first place to be considered when translating a poem. The beauty of sense is to achieve the faithful conveying of the sense. Mr. Xu once analyzed the "sense beauty" in the translation of poetry in a TV program: Tang poetry emphasizes "the combination of poetry and painting", with painting in the poem and poetry in the painting. The poet is very particular about artistic conception, and only a few words or phrases are used to depict the beautiful "artistic conception". It is this artistic beauty that he tries his best to embody in his translation.

浔阳江头夜送客，枫叶荻花秋瑟瑟。

In maple leaves and rushes autumn seemed to sigh

This poem explained the story of the time - maple leaves, flowers, rustling autumn wind night. Through three kinds of natural scenery - maple leaf, flower and autumn wind - the author reposed the feeling of desponding sadness in his heart. Xu not only faithfully translate the maple leaves, autumn, flowers, but also add a verb 'sigh'. The maple leaves howl in such a somber autumn wind, but the reality is the poet sighing. The use of the verb sigh seems to make the "sense" more beautiful. Here is another example extracted from this poem

醉不成欢惨将别，别时茫茫江浸月。

Without flute songs we drank our cups with heavy heart;

The moonbeams blent with water when we were to part.

'With heavy heart' have combined the words "不成欢" and "惨" into one preposition phrase. In his translation, the moonbeams blend with water in the boundless river and the reflection of a bright moon in the water. Perhaps the reflection in the autumn wind is still moving and quiet. This gives people a sense of emptiness, loneliness and frustration.

东船西舫悄无言，惟见江心秋月白。

Silence reigned left and right of the boat, east and west;

We saw but autumn moon white in river's breast.

These two poems write pipa player's performance effect. Silence reigned and left and right of the boat, east and west mesmerized the listeners, who were still immersed in music and the silence surrounding them was well expressed. The word "breast" in Xu's translation is commonly used to express the human or animal breast or refer to the human breast. Here, river's breast reminds people of the bright moon, which is printed not only in the river, but also in the poet's heart.

4.2 Analysis from the Beauty of Form and Sound

Chinese traditional poetry emphasizes rhyme which accords to the law, level and contrast. While modern English poetry are relatively free, no rules, no level and oblique tones, antithesis, refined language, image clear. The huge differences between the two languages make it difficult to translate Chinese metrical poems into English. In his translation, Xu not only needs "sense beauty", but also needs sound beauty (with sound ruler, tonal pattern and rhyme) and shape beauty (with symmetrical pattern and even sentence). *Song of a Pipa Player is* the original poem for the seven-word poem, rhyme between sentences. In Xu's English translation, it can be seen that the

translated poem has a neat rhyme, a neat step, and the number of sentences is equal to that of the original poem.

大弦嘈嘈如急雨，小弦切切如私语。

The thick strings loudly thrummed like the pattering rain;

The fine strings softly tinkled in a murmuring strain.

These two sentences describe the image of music of pipa music. The original poem rhymes with neat contraptions. The onomatopoeia of "snappy" and "sharp" are used to describe the sound of large strings and small strings popping up. In terms of sound beauty, rain rhymes with strain, and the original poem is also used to make thick strings and fine strings, intensive thrummed and josh tinkled, the pattering rain and murmuring strain compare with each other in form, adding light and light tones, it is hard to find a sense of music beauty.

银瓶乍破水浆迸，铁骑突出刀枪鸣。

Suddenly we heard water burst a silver jar,

And the clash of spears and sabers come from afar.

This sentence means music burst out from the almost frozen place, reflecting the intense burst of pipa girl's feelings. Xu translated "乍" to mean "Suddenly" in the original text. However, there are similarities in the sound effect. The verb "burst" conveys the image of water bursting into an object, and "clash" is used to express the "shooting" of knives and guns. Rhyming with the jar in the previous sentence, the translator deliberately changed the sound of knives and guns to "come from afar", indicating the translator's determination to pursue "sound beauty".

5. CONCLUSION

The "Three Beauties" theory has exerted a great influence on poem translation studies. This thesis has discussed Xu's English translation of *Song of a Pipa Player* under the framework of the "Three Beauties" theory put forward by Xu Yuanchong who is the prominent poem translator. A general view can be arrived at that the "Three Beauties" theory is a successful and effective device to examine *Song of a Pipa Player* from the aesthetic aspect. Specifically, as for the beauty of sense, Xu follows the meaning of the original poems with using various rhetorical devices and he put the beauty of sense into the first place with taking the risk of losing the beauty of sound and the beauty of form. As to the beauty of form, Xu's translation on *Song of a Pipa Player* pursues the similarity of the structures in phrase and sentence with slightly changing the orders of the meanings in the lines. In terms of the beauty of sound, Xu's translation on *Song of a Pipa Player* deals with the rhymes and meter between lines with obeying the musical quality of *Song of a Pipa Player*. Although, it is difficult to completely fulfill the three principles in the "Three Beauties" theory, Xu's translation has been trying the best to meet with the all the principles to represent the beauty of the original poems in different dimensions, and to real the images and emotions of the author. Therefore, this thesis exemplifies the effectiveness of the "Three Beauties" theory as a tool of translating Chinese classic poems into English.

REFERENCES

[1]Guo Yacen. "A Comparative Study on Translation of Mao Zedong's Poetry from Eco-translatology Perspective." Diss. North China University of Technology, 2017.

[2]Li Qing. "A Contrastive Study on the Translations of Tz'u Poems by Li Qingzhao." Diss. East China Normal University, 2005.

[4]Li Yuwei, "On the English Translations of Mao Zedong's Poetry in the Light of Medio-Translatology." Diss. Guizhou University, 2017.

[5]Song Min. "Study on the Translation of Image in Mao Zedong's Poems from the Perspective of Palmer's Cultural Linguistics -- A Case Study of Xu Yuanchong's Translated Version." Diss. Xi'an University of Technology, 2017.

[6]Sun Yao. "Probing Xu's Translation of Classical Chinese Poems from the Perspective of the 'Three Beauties.'" Diss. Shanghai International Studies University, 2012.

[7]Yang Quanhong. "The Study of Qian Zhongshu's Translation Thoughts." Diss. Shanghai International Studies University, 2007.

Application of Computer Software Technology Based on Big Data

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Abstract: The rapid development of science and technology has enabled China to quickly enter the stage of modernization. As an effective tool for processing data, computers play an important role in the era of big data. The use of computers to process big data is inseparable from the assistance of related software technologies. Only by developing effective software technologies can we take advantage of big data. At present, China's computer software technology has exposed some problems in the context of big data, and we need to concentrate on solving it.
Keywords: Big data; Computer software technology; Application

1. INTRODUCTION

The progress of the times and the development of science and technology have enabled China's various industries to usher in new development space. In recent years, with the continuous development of information technology, computer software has gradually become an important technical means for the development and progress of all walks of life. Strengthening the research and development of computer software is particularly important to promote the long-term development of our society [1].

2. THE IMPORTANCE OF COMPUTER SOFWARE TECHNOLOGY TO HTE DEVELOPMENT OF THE ERA OF BIG DATA

With the rapid development of the era of big data, the status of computer technology in the society has become more and more important, and its application range is very wide. Based on theoretical knowledge, computer data processing technology effectively manages relevant information and conducts specific applications through a series of data analysis. This technology can accurately obtain data, thereby improving work efficiency, accelerating enterprise development, and ultimately improving overall efficiency [2] .Through the computer network system, thousands of households can understand all kinds of information outside without leaving home. People can not only use the Internet to buy all kinds of goods they want, but also can chat online, teach online, etc., and use computer network technology to complete various information exchanges [3]. In addition, administrative agencies set up official websites to conduct office work. Data and information between industries can be shared through computer network technology. The application of computer science and technology is gradually changing people's daily life and work and study. In addition, due to the continuous advancement of science and technology, computer science and technology has made breakthroughs. Among them, nanoelectronic technology has become more miniaturized, intelligent and high-speed, effectively solving the integration and processing speed of computer technology. Double constraints. The wide application of computer science and technology is an indispensable technology in the society for the current information age. The data flow structure is shown in figure 1.

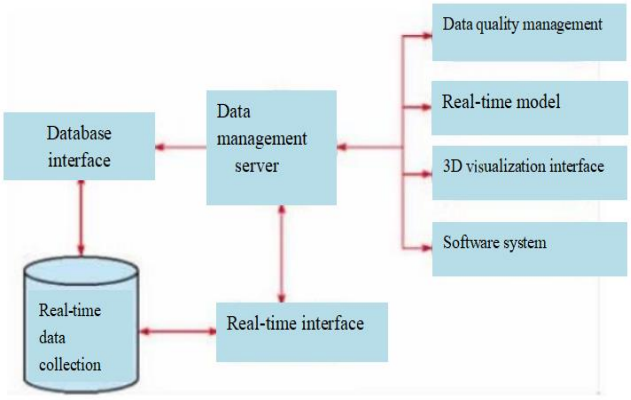

Figure 1 Data flow structure

3. EFFECTIVE MEASURES FOR APPLYING COMPUTER SOFTWARE TECHNOLOGY IN THE ERA OF BIG DATA

3.1 Virtualization Technology

Virtualization Technology One of the key applications of computer software today mainly refers to the use of big data as a tool to perform internal optimization configuration management of virtual resources, so as to achieve the purpose of improving information processing efficiency and user satisfaction. In recent years, virtual technologies have developed at a faster pace at home and abroad. Many companies and research institutes are committed to combining big data with virtual technologies, because virtual technologies can directly improve people's daily lives, such as the recent popularity. The VR and AR industries combine virtual technology with big data to summarize popular scenes through big data technology, design related application interfaces, and display them with virtual reality technology. Improve the scientific research level of virtual technology, and

at the same time facilitate the innovation and development of virtual technology, and continue to invest in the profit and capital, so as to further develop virtual technology and big data [4].

3.2 Cloud Storage Technology

With the development of the Internet of Things era, more data will follow. Usually, people store data in a local drive disk, but because the data generated is infinite, traditional computer storage technology can no longer meet the increasing practical needs of people. According to the statistics of major industries, the amount of unstructured data has accounted for more than half of the total data. For the storage field, unstructured data often accounts for more than 75% of the total storage space. In addition, a large amount of storage data requires huge storage cost support, which has become a hard expenditure of many enterprises, and most of the data has a storage cycle. Some historical data tends to have low access rate, low availability, and waste huge storage space. The cloud storage technology is different from the traditional storage technology. It not only optimizes many shortcomings in the traditional storage mode, but also protects the host from Trojans and hackers, ensures the integrity and security of the information, and effectively solves the storage of the traditional storage mode. Short time, small storage space, and wasted disk space reduce the cost of expanding disk space and improve storage performance.

3.3 Information Security Technology

The Internet is an open platform. It has certain security problems and is vulnerable to attacks by viruses. A large amount of data is attached to the Internet. Most technologies depend on the Internet, and there may be a correlation between data and data. This increases the risk. Therefore, it is necessary to strengthen the security of the Internet and improve security risks, thus designing information security technology. Although China's information security technology is still lacking, it has guaranteed the security of the Internet and data to a certain extent, and provided a guarantee for the development of the era of big data.

3.4 Hardening Software Firewall

The security of computer software technology has become a key issue at this stage. How to ensure the security of information in the information age has become a difficult problem. After all, there are already many non-issuers who can use the more mature technology to obtain the user's personal information, thus interfering with the interests. This situation has also caused some people to question big data technology. In order to be able to dispel the user's doubts, we need to find ways to improve the security of computer software. In fact, the way to protect user information has been proposed a long time ago, that is, set up a firewall and provide early warning of illegal intrusions. However, such a firewall is not necessarily foolproof. Many software fire protections are not able to organize 100% illegal intrusion. This is related to the level of the firewall. In order to truly protect the security of user information, we can strengthen the firewall of the software. Only by ensuring that the firewall cannot be illegally invaded, the user's information security can be guaranteed. To achieve this, the computer software technology we designed can be regarded as a success. Users will be more comfortable when applying the computer software technology we designed. The application of computer software technology in many industries will be more effective. In fact, the fight against cybercrime has been a major problem that the judiciary needs to address in recent years. With the maturity of network technology, it is extremely urgent to formulate strict network information security regulations. The security of network information is closely related to the development of many business, especially for computer software application technology. If there is no strong information security protection regulations, it will become very dangerous to use computer software to process cloud data. Security will not be effectively protected.

4. HOW TO DO A GOOD JOB IN COMPUTER SOFWARE TECHNOLOGY IN THE CONTEXT OF BIG DATA

4.1 Computer Software Security Challenge

In the big data era, in addition to the above key applications, computer software technology faces the challenge of security. As computer software accounts for a large proportion of people's lives, it is inevitable that many hackers want to maliciously attack computer software. To obtain relevant data, in order to profit. In addition, the operation of the computer is also affected by many factors, such as data leakage in the case of extreme weather or poor host storage, and some network companies may also have internal data leakage problems, such as the recent user data of a network company in the United States. Door event. The above problems are all problems to be overcome in the development of computer software technology in the era of big data. It is necessary for technicians to solve them one by one in the development, focus on the issues, and solve the related problems to the greatest extent, so that the security of computer software can be guaranteed.

4.2 Cultivate New Talents with Innovative Consciousness

Only with the help of professional talents can we establish a more professional computer software technology application system. After building a more professional computer software technology system, we can undertake more data processing tasks and provide users with more abundant data processing functions. In this way, users will have more trust in our computer software technology. Correspondingly, China's computer software technology will improve its own reliability. On the contrary, if we can't do this, China's software technology development will be

difficult to meet the actual needs of users.

5. CONCLUSION

The application of big data technology and computer software technology is a cause that China can only develop vigorously at present. The development of these two technologies is of great significance at this stage. If we can't do the application of these two technologies, we will gradually be eliminated by the trend of social development. Of course, developing and applying big data technology and computer software technology is not an easy task. In order to improve the reliability of computer software technology, we need to work hard in many aspects.

REFERENCES

[1]Cai Jinhua. Application of Computer Software Technology in the Age of Big Data. Electronic Technology and Software Engineering, 2019(7): 50-51.

[2]Ye Wenzhao. Application Research of Computer Software Technology in Today's Big Data Era. Computer Products and Circulation, 2019(4): 25.

[3]Liu Changyin, Hou Xueyan, Hou Yanquan, et al. Application of computer software technology in the era of big data. Science and Technology Economics Guide, 2017, 2(12): 12-14.

[4]Hao Saisai. Application of Computer Software Technology in the Age of Big Data. Digital Users, 2017, 23(30): 14-16.

Preparation of Ganoderma Ganoderma Protein Milk

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Abstract: Using soybean as main material, the preparation of liquid-fermentation soy milk by ganoderm applanatum was studied. Taking the content of Ganoderma lucidum polysaccharide as the index, the optimum fermentation conditions were determined by orthogonal test as follows: inoculum size 6%, fermentation temperature 27 °C, fermentation time 6 d. The blending test of fermentation broth showed that when 6% sucrose and 0.1% lactic acid were added, the taste of fermented product was the best.
Keywords: Ganoderm applanatum; Fermentation

1. INTRODUCTION

Ganoder mapplanatum is also called Ganoderma. By pharmacological experiments [1-5], the polysaccharide substance in Ganoderma tabulae can improve the immune ability of the body. It has the effect of pain relief, heat clearing, volume, hemostasis and sputum reduction; It has obvious anti-tumor, anti-radiation, hypoglycemia, liver preservation and detoxification, and anti-aging. According to clinical report [6-8], Ganoderma can be used to treat atherosclerosis, hypertension, angina pectoris, neurasthenia, diabetes, hepatitis, nephritis, tumor, gynecological disease and other diseases.

Soybean is the king of protein in plant food in nature. Protein beverage made from soybean is considered to be a cheap substitute for milk, but there are soya flatulence factor (tassel, cottonseed sugar) and bean flavor, which makes it difficult for consumers to accept it. Ganoderma lucidum can produce rich enzyme system in the growth process, using Ganoderma lucidum to ferment soybean protein milk, the glycosidase can degrade stachyose and cottonseed sugar, at the same time, Ganoderma lucidum can also produce Ganoderma lucidum polysaccharide and other active components, thus improving the nutritional value of soybean milk. In this paper, the optimum conditions of Ganoderma lucidum fermented soybean milk were studied, which provided a new way for the development and utilization of soybean.

2. MATERIALS AND METHODS

2.1 Materials

Strain: provided by the laboratory of Zhoukou normal University.

Soybean: market, full particles, no mildew, no impurities.

2.2 Culture medium

PDA medium [9]: potato 20%, sucrose 2%, potassium dihydrogen phosphate 0.3%, magnesium sulfate 0.15%, Agar 2%, add water to 1000 mL.

Liquid seed medium [10]: glucose 1%, sucrose 2%, magnesium sulfate 0.05%, peptone 1%, beef extract 0.5%, potassium dihydrogen phosphate 0.1%.

2.3 Method

2.3.1 Strain preparation

Strain activation: the preserved strain was transferred to PDA medium, cultured at 25 °C for 4 days, and the same method was used for secondary activation.

Seed liquid preparation: the mycelium in solid medium was inoculated into seed medium and cultured in gas bath constant temperature oscillator for 4 days at 25 °C.

2.3.2 Preparation of soybean protein solution

The soybean with full particles and no mildew, no impurities and no insect moths was selected; soaked in tap water for 24 hours and changed water once during the period; drain the water, mix the soaked soybean and water in a certain proportion, grind the pulp, and filter to make protein solution.

2.3.3 Preparation process of Ganoderma lucidum fermented protein milk

Soybean cleaning, soaking, pulping, filtering, sterilization, inoculating, fermentation, homogenization, mixing and sterilization of the finished products

2.3.4 Determination of polysaccharide content

The content of polysaccharide was determined by phenol-sulfuric acid method: 1 mL, of fermentation broth was added with 1 mL of 5% phenol solution and 5 mL concentrated sulfuric acid, then shook well after 30 min, the OD490 value was determined at 490 nm wavelength, and the concentration of polysaccharide could be calculated by replacing OD490 value with regression equation.

Content of polysaccharides in fermentation broth = polysaccharide concentration × volume of fermentation broth

3. RESULTS AND DISCUSSIONS

3.1 Determination of Fermentation Conditions

Taking the inoculum size, fermentation temperature and fermentation time of Ganoderma lucidum as the main factors, an orthogonal experiment with three factors and three levels was designed to study the interaction between the single factors of appeal and to determine the optimum technological conditions. The factor level and results of the test are shown in tables

1 and 2, respectively.

Table 1 Levels of orthogonal experimental factors.

level	factor		
	A Inoculum concentration/%	B Fermentation temperature/℃	C Fermentation time/s
1	4	25	4
2	5	27	5
3	6	29	6

Table 2 Orthogonal test results

Experimental No.	A	B	C	Ganoderma polysaccharide content /（g/kg）
1	1	1	1	4.25
2	1	2	2	4.54
3	1	3	3	4.81
4	2	1	3	5.12
5	2	2	1	4.26
6	2	3	2	3.91
7	3	1	2	4.66
8	3	2	3	5.08
9	3	3	1	4.38
k1	4.53	4.68	4.30	
k 2	4.19	4.63	4.37	
k 3	4.71	4.37	5.01	
R	0.52	0.31	0.71	

Table 2 shows that the effects of weight, fermentation temperature and fermentation time on polysaccharide yield are as follows: C (fermentation time) > A (inoculum size) > B (fermentation temperature). The optimum scheme is A3B2C3, that is, fermentation time is 6 h, fermentation temperature is 27 °C, inoculum size is 6%.

3.2 Allocate

Because the fermentation broth contains Ganoderma lucidum polyphenols, triterpenoids and other substances, it has a bitter taste [11]. Therefore, a certain amount of sucrose and lactic acid should be added to the fermentation broth to improve the bitterness and taste of the product.

3.2.1 Effect of sucrose addition on taste

Sucrose 2%, 4%, 6%, 8%, 10% were added to the fermentation broth respectively. It can be seen from Table 3 that sucrose content has obvious effect on taste. When the amount of sucrose was less than 6%, the sweetness was weak and could not cover up the bitterness of Ganoderma lucidum fermentation broth. When the sucrose content was more than 6%, the sweetness overplanted, which covered up the unique flavor of Ganoderma lucidum, so the optimum sugar content was 6%.

Table 3 Effect of sucrose content on taste of products

Sucrose addition /%				
2	4	6	8	10
weak sweet taste and heavy bitter taste	Sweet, bitter.	Moderate sweetness and weak bitterness	The sweet taste is heavy and has no bitter taste.	Sweet, no bitter taste, bad taste.

3.2.2 Effect of lactic acid addition on taste

A certain amount of lactic acid and 6% sucrose can be added to the fermentation broth, and the effect of lactic acid addition on taste is very obvious. Table 4 shows that when lactic acid content is less than 0.1%, the sour taste is weak, and the sweetness of sucrose can not be balanced. When the lactic acid content is more than 0.1%, the sour taste is too heavy and the taste is not in harmony. Therefore, the optimum amount of lactic acid is 0.1%.

Table 4 Effect of the addition of lactic acid on the taste of the product

Lactic acid addition/%				
0.05	0.075	0.1	0.125	0.15
weak sour taste and the heavy sweetness	sour taste and a heavy bitter taste	moderate sour and sweet	heavy sour taste	The heavy sour taste and bad taste

4. Conclusion

(1)In the orthogonal test at the level of three factors affecting fermentation, the optimum fermentation conditions are:inoculation volume 6%, fermentation temperature 27 °C, fermentation time 6d.

(2) The experiment of the fermentation broth showed that when 6% of sucrose and 0.1% of lactic acid were added, the taste of the fermented product was the best.

REFERENCES

[1]Yu Yingjun, he Libo, he Wei. Study on immunomodulatory effect of tree tongue polysaccharide GF. Information on traditional Chinese Medicine, 1999, 16(2): 64.

[2]Mao Xiaolan. Chinese macrofungi. Zhengzhou: Henan Science and Technology Press, 2000483.

[3]JOZICAH, MARIN B, BRANHA W. Effects of fundal polysaccharides from Ganoderma lucidum submerged biomass cultivation. Food Technol Biotechnol, 2001(39): 27-33.

[4]Xiong Chuan, Luo Qiang, Jin Xin. The physical and chemical properties and the immunomodulatory effect of polysaccharides from Ganoderma lucidum. Microbiology, 2018, 45(4): 825-835.

[5]Li Tian, Huang Zirui, Pan Yuyang. Analysis of chemical constituents of Ganoderma lucidum and antioxidant activity of polysaccharide triterpenes. Food Industry Technology, 2017, 38(19): 63 -73.

[6]Liu Meiqin, Li Jianzhong, Kong Fanzuo. Research progress of Ganoderma lucidum polysaccharide. Microbial notice, 1998, 25(3): 173-175.

[7]Xing Guoqing. Anti-aging effect of Taishan Ganoderma lucidum polysaccharide oral liquid. Chinese Journal of Gerontology, 2001(3): 235.

[8]Wang Zhijun, Wang Sen, Ma Ruixia. Biological characteristics and three-dimensional soil-covering technology of Ganoderma lucidum. Edible fungus, 2018, 40(4): 43-44.

[9]Du Lianxiang, wait. Industrial microbial experimental technology. Tianjin: Tianjin Science and Technology Press, 2000, 25.

[10]Zhou Lianyu. Optimization of submerged fermentation conditions of Ganoderma lucidum and screening of excellent strains. Journal of Hunan Agricultural University, 2005, 12: 16-21.

[11]Gao Yurong, Sun Wenhong. Preparation of Ganoderma lucidum liquid submerged fermented soybean milk beverage. China Food News, 2008, 28(02): 178-180.

Problems and Countermeasures in Computer Software Testing

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Abstract: The rapid development of China's economyis a rapid development of China's computer industry. With the rapid development of computer network technology, computers have entered the various fields of human society at an alarming rate, and have gradually become an indispensable part of people's lives. Computers go from partial to whole, and computer applications are mainly in software applications for people. Daily life learning brings great convenience, and computers make people's lives richer.
Keywords: Computer; Software testing; Problems and countermeasures

1. INTRODUCTION

The rapid development of China's economy has promoted the rapid development of various industries in China. With the advent of the era of big data, database support systems are widely used in computer software development. In order to ensure the stable operation of the database, the corresponding test project must be done [1]. However, due to the high complexity of database design, the amount of data information processing will increase accordingly. At this time, data redundancy will occur, which will affect the computer design function and performance [2].

2. COMPUTER SOFTWARE DEVELOPMENT

The development of computer software is characterized by openness and networking. Openness refers to the development of the information explosion era based on the open platform of computer software. Software development members learn communication through computer platform and master core technology. Computer development technology members find their own shortcomings in constant communication and drive the development of computer software industry in promoting their own development. Intelligent means software development and application intelligence, intelligent software can provide high-quality services, network refers to software development to achieve world communication, rapid development of the network to greatly shorten the global distance, software developers will continue to communicate personally Technology realizes network, and enterprises contribute to the diversity of computer network functions. In the early development of the computer software market, it was affected by imperfect incentive mechanisms. Many enterprises chose to withdraw from the market with greater difficulty in development. Most computer software companies have clear market prospects. The golden period of China's software development is mainly concentrated in the past 20 years [3]. The level of relevant technical personnel has been greatly improved in the industrial optimization and upgrading. More enterprises have turned their investment focus into computer software development. China's development of computer software has been carried out in terms of talents. Strong support.

3. DATA CONSISTENCY TEST

3.1 The Primary Key Test of the Table.

In the primary key of the test table, first need to analyze the system design requirements.

There is a corresponding information record requirement for the primary keys of all tables. Therefore, in order to ensure the accuracy of the test results, the consistency test of the primary key of the table must be implemented. If the test result is not unique, you will need to reset the primary key of the table.

3.2 Table and Table Main Foreign Key Relationship Test

In the database testing technology, it is necessary to test the information and length of the main foreign key key field to ensure that it meets the consistency requirements. However, since most computers do not pay attention to the table and table main foreign key relationship test during the software development design phase, the standard field test is fuzzy, which affects the accuracy of the test results. 3. Delete the conformance test. When testing the cascading table, you should ensure the consistency requirement of information data deletion. When the user deletes the primary table data information, the corresponding report data is also deleted accordingly. Such data consistency deletion requirements can improve the efficiency of data information processing to a large extent, and can also use computer software to delete and update data information.

3.3 Analysis of Computer Software Security Detection

The invention of computers brought about an information revolution. Computer is an indispensable tool for realizing the information society. Computer chemical process simulation software is a combination of chemical engineering and system

engineering. Its invention makes the cumbersome chemical workflow more convenient. The application of software in the field of sports, such as the organization and management of large-scale sports competitions, uses computer technology to provide reliable game information. In recent years, the electronics industry has developed rapidly, such as the rapid development of the Internet, and the rapid development of mobile phone software. In the biological practice research, computerized technical action image analysis, sports psychology questionnaire measurement, etc. were used. Computers bring convenience to people's lives, but they also bring some drawbacks. Everyone is required to abide by the ethics of computer application. With the development of the Internet, various viruses spread a lot, causing negative effects such as cyber violence. The purpose of computer software security detection is to detect security vulnerabilities in software development, computer network structure is fragile, and the limitations of firewall technology cause software detection problems. When the tester conducts computer software testing, the software should be comprehensively analyzed. The inspectors should have strong professional ability and better detect the security vulnerabilities in the software when the computer software is safely detected.

3.4 Reasonable Test Processing for Interface Data

In the process of having an interface between computer software systems, the interface transmits data, and it is important to control the accuracy and reliability. At this time, the relevant interface data information of the system needs to be extracted, and a temporary form is prepared, and then The data information closely related to the relevant interface is extracted and compiled into a temporary form. After the two tables are compared with each other, the consistency of the data information is guaranteed. For such testing technology, it is possible to fully understand whether the interface data between the systems meets the requirements of consistency, and strictly control the data information.

3.5 Software Testing Technology

The key technologies widely used in software testing today are test techniques based on code, specifications, faults and usage. Specification-based testing techniques include decision tables, formal specifications, and so on. The decision table is used to represent the logical relationship between conditions and behaviors, and the finite automaton is used to model the test system. Code-based testing techniques include reference model building and data flow testing. The nodes and the elements in the corresponding program, the side represents the control conversion between the nodes. In the data flow test, the value of the same variable is seen along the different flow directions of the flow chart. False guessing in fault-based test techniques is based on the experience of the tester to roughly guess the most likely fault. Fault implantation monitors the results by manually implanting the fault into the program. The modification test is a grammatical modification that causes the test case to run on the original version. The Flow chart is shown in figure 1.

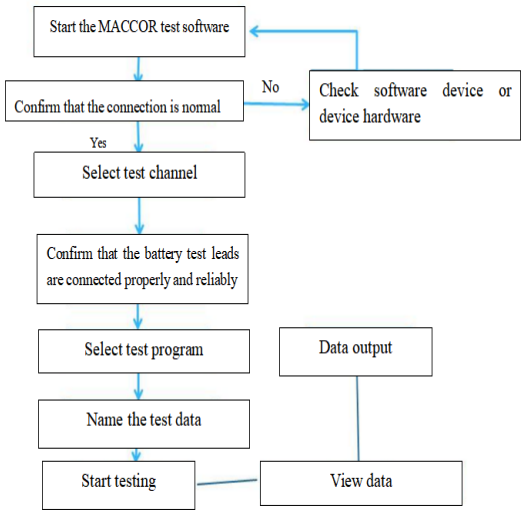

Figure 1 The Flow chart

3.6 Physical Architecture Test

The integrated test method mainly uses the program mode or other tool methods to check the data stored in the database system, and understand the setting status of the data source before storing the data. In the storage work, the program system can comprehensively check the type of related data and the character length status, and whether there is an error vulnerability. Such error data information will be stored in the relevant files of the test log. After the test is completed, the program will automatically generate relevant test log files regardless of whether the test processing can be successfully carried out. If an error occurs, it only needs to be targeted. The contents of the log related files are analyzed, and the location of the erroneous data can be found, and the work effect of all aspects can be improved comprehensively, and the current work tasks can be better completed.

3.7 Countermeasures for Computer Software Security Detection

Computer factors are the main cause of computer security problems. Computer maintainers should be well interacted with security maintenance software, computer network security management should be strengthened, relevant security management systems should be improved, and training for professionals should be strengthened. Strengthening the requirements of firewall technology and other methods to prevent tampering and destruction of network data is an active means of preventing network information security. Network security is a system engineering. It is necessary to combine various security technologies to build an efficient and secure network system. For hardware system security issues, necessary settings, such as server passwords, are required to take strict security management

measures to prevent vulnerability port access. Dynamic detection methods include non-executable stacks, secure sharing, sandboxing, and more. The dynamic detection technology performs computer software to detect the problems in the software. The dynamic detection technology has the advantage of not modifying the software source code. The non-executable stack technology can only detect the organization destroying the stack attack, which may cause a small amount of compatibility problems. The mapping technique works only in program loading. Comprehensive use plays an important role in computer software security testing. Static detection techniques for computer software inspections detect potential security issues in computer software by using program analysis techniques. You can find a lot of problems in the software, static detection is more convenient and quick. The security vulnerability detection protection technology first uses various scanning technologies to scan the target host port, and finds the corresponding service vulnerability detection code in the vulnerability feature database. When the vulnerability scans, the scan scheduling module can be controlled to suspend, continue, etc., vulnerability scanning. The scheduling uses a message mechanism to coordinate each working module, call detection and verification, etc., and store the actually detected vulnerabilities in the library.

4. CONCLUSION

The Internet has become an indispensable part of people's lives. Computers bring unparalleled benefits to other technologies. The development of software also has potential hidden dangers. Specific security detection methods are needed. Software security detection is in the information age. An important part of the security system, computer professionals should strengthen the study of computer detection technology, and further study software security detection methods to make it better for human services.

REFERENCES

[1]Sun Huayou. Research on Database Testing Technology in Computer Software. Journal of Changzhou Vocational College of Information Technology, 2017, 16(6): 25-27.

[2]Sun Huayou. Research on Computer Software Database Testing Technology. Journal of Changzhou Institute of Information Technology, 2017, 16(6): 32-45.

[3]Wang Ying, Feng Jiahui. Virtual Instrument Technology Based on PC System. Electronic Test, 2016, 2(13): 4-6.

Research on Network Information Security Policy in the Background of Big Data

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Abstract: The rapid development of China's economy has enabled China to quickly enter the Internet era. The era of big data has facilitated people's life and learning. People from all walks of life can benefit from big data technology. Students can broaden their knowledge channels to learn more easily. Workers can improve their work under the influence of informatization. Efficiency, but at the same time, big data technology is not a panacea. Netizens in the era of big data face network information security issues. Once the information and privacy of netizens are leaked or violated, it may cause economic and mental damage, or even threats. The safety of netizens.
Keywords: Big data; Computer software technology; Application; Big data background; Network information; Security assurance strategy

INTRODUCTION

The progress of the times and the development of science and technology have given new development space for various industries in China [1]. For the coordinated protection of network information security, it is necessary to increase the investment in technology. In the process of network information security collaborative protection, according to the existing phenomena, more security information engineers are also called to exert their own technology and energy and contribute a force [2].

1. NETWORK INFORMATION SECURITY

The first standard for network information security defines WEP (Wired Equivalent Privacy) for user data authentication and data confidentiality over a wireless link. Unfortunately, WEP has serious vulnerabilities. Even if a mobile app is discovered, the secure authentication key is lost. In this case, the computer cannot be used to secure user information. A computer network is a stream cipher that has a set of weak keys that become particularly vulnerable if a part of the key is leaked to the attacker. In WEP, the RC4 key is a concatenation of 24-bit initialization vectors, sent in clear text with the encrypted frame, and is a 40-bit WEP key [3]. An attacker can collect computer network information to detect weak keys. In computer networks, security authentication and protection establishment processes are closely linked. The three elements involved in security authentication and protection are requesters, authenticators, and protection servers. The requester corresponds to the user who wants security protection; the authenticator is a centralized server that can access the authentication to verify the key database of the mobile user; the protection server corresponds to the access point to implement security protection control, and only allows requests from the protection server Access. Certification and protection can be divided into two parts. The first part aims to assign a pairwise master key (PMK) to the requester and the authenticator; the second part comprises requesting the paired transient key (PTK) verifier between the protector and the user based on the obtained PMK. The computer network security authentication key and protection are only used for secure authentication keys based on EAP-based security authentication and have a limited lifetime. Figure 1 Security Certification and Protection Distribution [4].

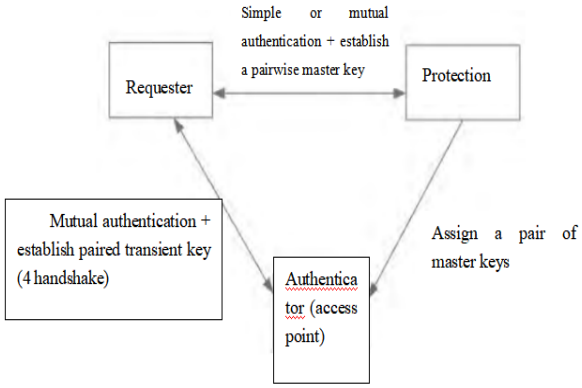

Figure 1 Security Certification and Protection Distribution

2. COMPUTER NETWORK SECURITY RISKS UNDER THE BACKGROUND OF BIG DATA

2.1 Hidden Dangers from Hacking

In recent years, the situation of hacking seems to leave the public's field of vision, but in the actual network behavior, there are still hidden dangers of hacking. Hackers generally maliciously invade the users of the network users and conduct online behaviors of netizens. The acquisition of illegal information, especially considering that most hackers are professional Internet industry practitioners, are very talented in the use of the Internet, so it may bring greater harm to the victims, for example, inside the enterprise. If the network is not properly protected, then important documents may be lost, business secrets may be stolen, and even a major economic loss will result, and the enterprise will face the risk of

bankruptcy and bankruptcy.

2.2 Computer Network Information Security is Affected by External Factors

For computers, it is mainly formed by the combination of hardware and software. Therefore, for the information security protection in the computer network, it is necessary to consider some influencing factors of the outside world. Relevant data shows that the main external factors affecting the security of computer network information are natural disasters or security problems caused by mistakes in the operations of related personnel. In terms of the performance of natural disasters, it mainly includes various factors such as lightning, fire, flood and earthquake in nature. Once these natural factors are generated, it will cause great damage to the development and operation of the computer in the later stage, and the protection of computer network information will be restricted in the later stage. The operation of computer network information security is mainly due to the fact that the relevant personnel who use the computer cause certain operational errors in subjective consciousness. Due to the lack of corresponding computer network security protection awareness and necessary professional operation ability, it is difficult to perform user password. Corresponding processing leads to a great hidden danger in computer network information security.

2.3 Wide Range of Information Collection, Poor Information Security Protection

In the era of big data and cloud computing, the degree of economic and social informatization is getting higher and higher, and the scope of information collection is becoming more and more extensive, involving many private information and military confidential information. In addition to basic identity information, it also includes financial transaction data, social network data, geographic location data, online speech, etc. Through the association and aggregation of these data, it is possible to mine and restore the social life of the network. The military information involves the secrets of the state. Through the real-time transmission of data, the information can be transmitted without the knowledge of the parties, and finally the leakage of confidential information.

3. COUNTERMEASURES FOR IMPROVING COMPUTER NETWORK INFORMATION SECURITY UNDER THE BACKGROUND OF BIG DATA

3.1 Building a Complete Hacker Prevention Mechanism

In order to ensure that the computer security of the computer is not invaded by hackers, the state and network developers should continually optimize their work to build a complete and professional hacker prevention mechanism. On the one hand, technicians should increase the research and development of professional network, prevent technical hackers from being outside the firewall, improve their professional level and comprehensive quality, and think about the hacker's intrusion from multiple angles, which can help solve hacking. On the other hand, the relevant state departments should strengthen their talent cultivation investment, encourage more excellent network talents to participate in the network information security protection work, give financial support, and build a professional computer network information. The security protection elite team, once the hacking problem occurs, the first time to confront, technical personnel and technical personnel should also strengthen exchanges and cooperation, develop more advanced technology to prevent hackers from invading. In addition, the state must improve the legal system, severely attack illegal cyber hackers, and protect the security of citizens' online behavior.

3.2 Improve the Information Security Management System in Computer Networks

In the operation of computer networks, the information security protection system needs to be further improved, which is also the most important source of information throughout the operation and implementation process. First of all, when accessing information for computer users, the access rights need to be limited accordingly. When using the relevant personnel of the computer to enter the platform they need, they need to verify their identity. For example, password verification, fingerprint verification, SMS verification, and the like. If a computer user violates the corresponding operational rules during the process of accessing the website, it is necessary to limit its subsequent behavior. Users who do not have access to the corresponding website should perform real-time closed management during the visit. During the subsequent connection development process of the entire website, the transmission of computer network information data will be blocked or even closed. At this point, computer users will also suffer a real-time mandatory shutdown when they visit the site.

3.3 Strengthen Embedded Training and Cultivate Safety Information Talents

Increase the training and training of safety information teachers, build good experimental conditions, strengthen training in practice links, and effectively improve the actual combat capability of safety information personnel. To further strengthen cooperation and exchange, and cultivate innovative scientific and technical talents, it is necessary to introduce embedded training. The so-called embedded culture refers to the combination of software and hardware. For safety information engineers, not only must we master the theoretical knowledge, but also the accumulation of practical experience. Improve your resilience and hands-on ability to solve problems quickly and accurately in the event of information security issues. It is necessary to increase the training of safety information engineers, help safety trainers to improve their own safety technology in a timely manner, and aim at the timely disclosure and

prevention of military confidential information leakage and illegal activities. Relevant security information personnel are the main players in network information security, so they must play their key role.

4. CONCLUSION

In the context of the era of big data, both ordinary Internet users, small and medium-sized enterprises, and national government departments are facing network information security threats. In response to these problems, we should start with regular inspection of computer systems, build a complete hacker prevention mechanism, and improve network virus prevention. The mechanism is jointly established by technology developers and relevant national departments to create a secure network environment.

REFERENCES

[1]Xu Haijun. Research on computer network security prevention in the era of big data. Computer CD Software and Applications, 2014, 23: 192.

[2]Xiong Haiqing. Computer network security precautions under the background of big data. Computer CD Software and Applications, 2015, 18(2): 160.

[3]Wang Jun. Computer Network Information Security and Protection Strategy. Communication World, 2018(06).

[4]Ma Minhu, Zhang Min. Information Security and Network Social Legal Governance: Space, Strategy, Rights, Capabilities. Journal of Xi'an Jiaotong University (Social Science Edition), 2015, (2): 92-97.

A Safety Early Warning Model Using WSN and Kalman Filter for Subway Project Construction

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Abstract: In view of the backwardness of the safety management methods in current subway construction projects, this paper proposes a safety warning model for subway construction based on improved BIM and WSN. The model includes an improved BIM unit, a WSN unit, an information coordination unit, and a security early warning unit. The system uses the improved BIM to formulate the various stages of the construction project, and uses the information of the monitoring objects identified in the WSN real-time acquisition plan to collaboratively process the comprehensive information. Once the warning value is exceeded, the early warning notification is issued. The system realizes the real-time communication and of safety information between the participants of the project, and significantly enhances the safety warning effect. It is helpful to realize the real-time of the safety warning of subway construction projects, which has certain significance for improving the safety management level.
Keywords: Wireless Sensor Network (WSN); Subway Construction; Safety Early Warning Model; Kalman Filter; Coverage Control; Node Deployment; Information Collaboration Unit

1. INTRODUCTION

According to the statistics of the International Occupational Safety and Health Association, the accident rate of the construction industry in all industries has been high. The main causes of accidents are the unsafe behavior of workers, the complex environment of the construction site, and the lack of scientific and effective safety management [1]. Traditional safety management methods, such as pre-worker safety training and routine safety routine inspections, cannot cope with complex changes in the construction site environment and large mobility of personnel. Therefore, effective safety monitoring and early warning play a very important role in construction projects management [2].

The rapid development and application of modern information technology provides a solution to the shortcomings of traditional security management methods. Literature [3] integrates BIM and PT technologies to construct an early warning system for workers' unsafe behaviors, which effectively prevents on-site accidents; Literature [4] uses RFID technology to mark heavy equipment and workers' equipment, once workers or machinery enter dangerous areas, security warning notice will be issued immediately. Literature [5] uses BIM as a communication and sharing platform, which integrates RFID technology to collect real-time, material, and machine safety information in real time, and realizes real-time and efficient safety warning on the construction site. Literature [6] integrates BIM and Wireless Sensing Technology (WSN) to provide real-time warning of workers' unsafe conditions in confined space construction. The above research mostly uses the traditional Building Information Modeling (BIM) as a platform for communication of safety information in project early warning. However, BIM only contains information related to the project itself, and it does not involve work and workflow related to the construction site. At the same time, BIM is unable to negotiate a change as a platform for the participants to change after the construction site changed. Therefore, this paper proposes an improved BIM to make up for the shortcomings of BIM, and combines WSN technology to build a construction project to realize real-time visualization of project security warning.

2. SYSTEM SUPPORT TECHNOLOGY

2.1 Improved BIM

The improved BIM incorporates Lean Construction (LC) ideas and BIM [7], consisting of programs, software and hardware to support lean workflow control at the construction site. It facilitates planning and monitoring of short-term work, and visualizes the status of work by deploying large-scale, touch-enabled displays with architectural models on the construction site. The structure of the improved BIM system is shown in Figure 1. The core of the system is the production, process, and state models. The input is the information about the project provided by the BIM modeler and each participant, and the output is the user interface. The improved BIM prepares the various stages of the plan under the Last Planner System (LPS) [8]. Therefore, the function of the user interface is to connect the corresponding project participants with the workflow

through each stage plan, and notify the personnel to construct.

In the improved BIM system, the production model is formed by the BIM modeler extracting rich information data from the design production model and the construction model. At the same time, it is the basis of the entire improved BIM system database, the parties can pass project information and view and modify data information through the BIM platform. The process model includes various construction methods, process generation targets, and resource generation targets. The state model contains the status of future work, current work, and ongoing work. Therefore, the improved BIM system not only visualizes the building model, but also visualizes the workflow and working status of the construction project.

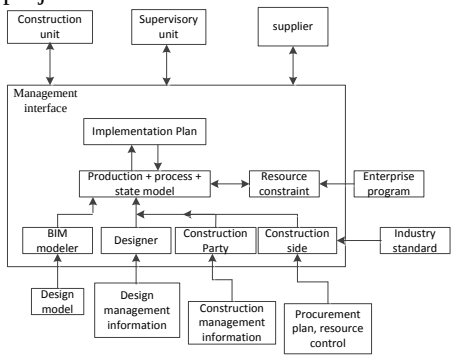

Figure 1 Structure of improved BIM system

2.2 Wireless Sensor Network

WSN is a multi-hop self-organizing network system composed of many inexpensive micro sensor nodes deployed in the monitoring area [9]. The purpose is to collaboratively sense, collect and process network coverage. Information about the object in the area is sent to the observer [10]. With the built-in, multi-layer sensing module, it can detect many kinds of substances that need to be monitored, including temperature, humidity, noise, light intensity, pressure, soil composition, speed and direction of moving objects.

The WSN includes sensor nodes, sink nodes and management nodes. In the sensor network, the sensor node has certain sensing, computing and wireless communication capabilities, and the nodes are randomly deployed in the monitoring area through self-organizing forming a network. They collect data in a collaborative manner and send the monitored data to the aggregation node in a multi-hop manner, and finally send the data signal to the management node via the internet, wireless network or satellite. System users can view, query, and search related monitoring data through the management node, and they can also configure and manage the sensor network.

At present, RFID technology is often used in the safety warning of construction projects. However, due to the poor anti-interference of RFID and the effective distance is generally less than 10m, the effect is not satisfactory. With WSN technology, a monitoring area with an effective radius of up to 100m can be formed, so that target information can be sensed in real time and efficiently. In the improved BIM, the pull flow control idea decomposes the schedule plan until the minimum daily plan is formed, and the daily plan can determine the daily process schedule. By combining the real-time collection information in WSN with daily plan, the security monitoring process and security status can be seen in the screen.

3. THE PROPOSED MODEL

The subway construction project safety early warning system consists of 4 unit: improved BIM unit, WSN unit, information coordination unit and security early warning unit, as shown in Figure 2.

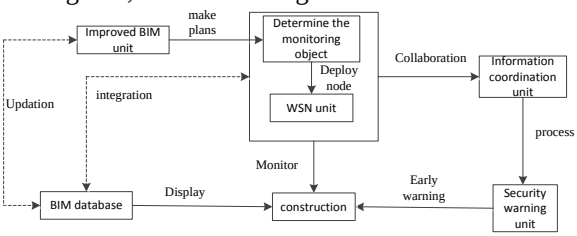

Figure 2 Structure of the security warning system

3.1 Improved BIM unit

Improving BIM is a phase plan for the preparation of the project under the LPS system, it makes up for the insufficiency of LPS's inability to achieve daily planning and the inability to obtain process status update information. It is an extension of the LPS system. Figure 3 is a diagram of the improved BIM workflow model. The project process begins with the master plan. The master plan is prepared by the owner and the construction unit. The plan is a macro control of the project and needs to determine milestones. The phase plan is the decomposition of master plan, including the identification of key tasks, the preparation of specific schedules and production capacity plans. Its role is to connect the master plan and the forward plan. As a refinement of the phased plan, the forward-looking plan includes determining the work order and the work package size constraint analysis, which is prepared by the construction unit and sent to the supervisory review. The above three stages are consistent with the standard LPS, they are executed in BIM. The main task of the weekly work plan is to determine the specific workload and choose the optimal work order. The security management at this stage is reflected in three levels.

(1) The planner of the construction unit need to perform a detailed constraint analysis on the prepared weekly plan to determine the workload, work order, duration and coordination time of the supplier during the phase.

(2) Due to the complicated environment of the construction site, manual inspection and other methods cannot feedback the safety status information of the monitored objects in real time. Therefore, the team leader of the construction unit and the site safety management personnel jointly decide whether to need

to deploy sensors to collect information in real time.
(3) Once the wireless sensor needs to be deployed, the weekly work plan should be adjusted in time.
The core of the process in improving BIM is the daily plan, which is also the smallest plan in the system. When the work is carried out as planned, the work will be completed after the inspection by the owner and the supervision unit. If there is a change in the work, the construction unit needs to propose a solution to the change and re-determine the supply plan with the supplier, and the owner and the design unit can improve the BIM system to propose improvement suggestions for the change plan. After the change work is completed, it will be audited by the supervisor. If the changed work still does not meet the requirements, it needs to be feedback to the weekly plan for adjustment and renegotiation until the review is passed.

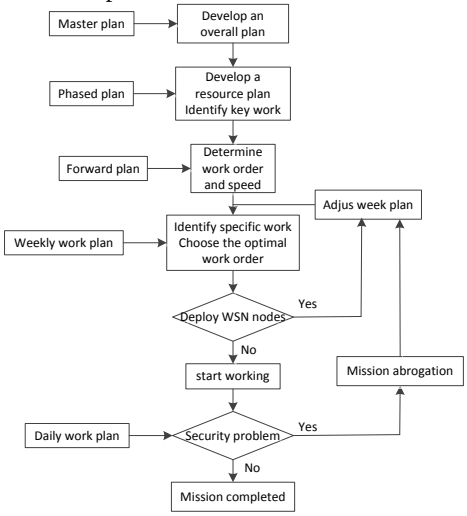

Figure 3 Diagram of improved BIM workflow model

3.2 WSN Unit

The on-site personnel of the construction unit must carefully analyze the potential hazard sources on the construction site during the weekly planning phase, determine the monitoring targets and the types of sensors required, and collect the perceptual information in the daily work, and feed back to the improved BIM unit [11].

3.2.1 Coverage control and node deployment

After selecting the appropriate sensor type based on the monitored object, it is necessary to consider the coverage control and node deployment issues in the WSN. The purpose of coverage control is to enable the sensing nodes in the network to effectively cover the monitored area, and do not form a blind spot or dead zone to ensure comprehensive monitoring of the monitored area. In the construction process, according to the characteristics of different monitoring objects, the corresponding coverage type should be selected. For non-mobile monitoring objects (such as foundation pits), point coverage control can be performed. A limited number of discrete target points are arranged in the monitoring area of such objects, so only a few specific target objects need to be monitored without grasping the global information. For mobile monitoring objects (such as personnel and machinery), regional coverage control should be carried out. Due to the irregular movement of personnel and machinery in a certain area of the construction site, the sensing range of the working node should completely cover the entire area to ensure that anything happening in the target area can be effectively monitored.
Since the sensing capability of the sensor node is relatively limited, it is often required that multiple nodes work together to complete the information collection of the external environment, and the construction site is divided into several areas. Therefore, a deterministic deployment mode can be adopted to form a rule topology, which is convenient for the on-site team leader to obtain maximum information and prolong the life of the wireless network.

3.2.2 Node positioning and target tracking

In WSN applications, the information collected by the sensor nodes must be combined with their position in the measurement coordinate system [12]. Therefore, in the monitoring process of the subway construction site, only by knowing the location information of the sensor node can the hazard source be quickly determined. This paper uses Kalman filter [13] to complete the positioning.
The Kalman filter-based positioning method uses the distance between the unknown node and the sensing node as the measurement result in the Kalman filter. The location of the unknown node is estimated based on the mathematical model of the person movement, and the location of the unknown node is considered as the prediction result in Kalman filter. By reasonable weighting the measurement results and prediction results, according to the best estimation after Kalman filtering in the previous step, the best estimation value at the current time is obtained, and the personnel positioning is realized.
(1) Equation of state
Assume that at the moment k, the coordinates and speed of the unknown node are:

$$X_k = \begin{bmatrix} x_k \\ \dot{x}_k \\ y_k \\ \dot{y}_k \end{bmatrix} \tag{1}$$

Where x_k is the coordinate on the x axis at the moment k; $\dot{x}_k$ is the velocity on the x axis at the moment k; y_k is the coordinate on the y axis at the moment k; $\dot{y}_k$ is the velocity on the y axis at the moment k;
To simplify the mathematical model of Kalman filtering, the equation of state is expressed as

$$X_{k+1} = f(X_k, u_k) = A_k X_k + u_k \tag{2}$$

In equation (2), u_k is the system noise sequence of the data model, A_k is the transition matrix, and:

$$A_k = \begin{bmatrix} 1 & \Delta T_k & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & \Delta T_k \\ 0 & 0 & 0 & 1 \end{bmatrix} \tag{3}$$

Where ΔT_k is the length of time variation, it can be assumed that the velocity $\dot{x}_k$ and $\dot{y}_k$ are stable in ΔT_k.

The following focuses on the relationship between two-dimensional coordinates, velocity and acceleration to obtain the key parts of the equation of state. First, an example is given to illustrate how to predict the coordinates of the unknown node at the moment $k+1$ using the coordinates (x_k, y_k), speed $(\dot{x}_k, \dot{y}_k)$, and acceleration $(\ddot{x}_k, \ddot{y}_k)$ at the moment k.

In order to simplify the derivation process, the unknown node starts to move at $t_0 = 0$, at this time, the speed of the unknown node is $(\dot{x}_0, \dot{y}_0) = (0,0)$, and the acceleration $(\ddot{x}_0, \ddot{y}_0)$ is non-zero. Assuming that at t_0, the position of the unknown node is $(x_0, y_0) = (0,0)$. According to these conditions, the coordinates (x_1, y_1) and speed $(\dot{x}_1, \dot{y}_1)$ of the unknown node can be predicted at t_1.

$$\begin{aligned} \hat{x}_1 &= x_0 + \dot{x}_0(t_1 - t_0) + \frac{1}{2}\ddot{x}_0(t_1 - t_0)^2 \\ &= \frac{1}{2}\ddot{x}_0(t_1 - t_0)^2 \end{aligned} \tag{4}$$

$$\begin{aligned} \hat{y}_1 &= y_0 + \dot{y}_0(t_1 - t_0) + \frac{1}{2}\ddot{y}_0(t_1 - t_0)^2 \\ &= \frac{1}{2}\ddot{y}_0(t_1 - t_0)^2 \end{aligned} \tag{5}$$

Where $(\hat{x}_1, \hat{y}_1)$ is the predicted coordinates of the unknown node at t_1.

At t_1, the coordinates of the sensor node i is (x_i, y_i), and the distance between sensor node i and the unknown node can be directly measured. Then the predicted distance $\hat{Z}_{i,t_1}$ from the unknown node to the sensing node can be calculated.

After using the Kalman filter, the relative accurate position of the unknown node at t_1 can be obtained and the relative accurate speed $(\dot{x}_1, \dot{y}_1)$ at t_1 can be updated.

$$\begin{cases} \dot{x}_1^2 - \dot{x}_0^2 = 2\ddot{x}_0(x_1 - x_0) = 2\ddot{x}_0 x_1 \\ \dot{y}_1^2 - \dot{y}_0^2 = 2\ddot{y}_0(y_1 - y_0) = 2\ddot{y}_0 y_1 \end{cases} \tag{6}$$

Equation (7) is available by formula (6):

$$\begin{cases} \dot{x}_1 = \sqrt{\dot{x}_0^2 + 2\ddot{x}_0 x_1} \\ \dot{y}_1 = \sqrt{\dot{y}_0^2 + 2\ddot{y}_0 y_1} \end{cases} \tag{7}$$

Predict the coordinates (x_2, y_2) and speed $(\dot{x}_2, \dot{y}_2)$ at t_2 using the relative coordinates (x_1, y_1) and speed $(\dot{x}_1, \dot{y}_1)$ at t_1. The subsequent steps are the same and finally we can derive:

$$\begin{cases} \dot{x}_{k+1} = \sqrt{\dot{x}_k^2 + 2\ddot{x}_k(x_{k+1} - x_k)} \\ \dot{y}_{k+1} = \sqrt{\dot{y}_k^2 + 2\ddot{y}_k(y_{k+1} - y_k)} \end{cases} \tag{8}$$

(2) Covariance equation of systematic error

The covariance equation of the Kalman filter can be expressed as:

$$P_{k+1} = A_{k+1} P_k A_{k+1}^T + Q_k \tag{9}$$

Where P_k is the covariance of the system state at k, A_{k+1} is the transition matrix, Q_k is the process noise.

$$Q_k = \frac{1}{6}\begin{bmatrix} 2\Delta T_k^3\sigma_x^2 & 3\Delta T_k^3\sigma_x^2 & 0 & 0 \\ 3\Delta T_k^3\sigma_x^2 & 6\Delta T_k^3\sigma_x^2 & 0 & 0 \\ 0 & 0 & 2\Delta T_k^3\sigma_y^2 & 3\Delta T_k^3\sigma_y^2 \\ 0 & 0 & 3\Delta T_k^3\sigma_y^2 & 6\Delta T_k^3\sigma_y^2 \end{bmatrix} \tag{10}$$

Here, σ_x and σ_y are the acceleration coefficients of direction x and y.

The distance between the unknown node and the sense node can be expressed as:

$$Z_{i,k+1} = \sqrt{(x_{k+1} - x_i)^2 + (y_{k+1} - y_i)^2} + V_{k+1} \tag{11}$$

Here, $Z_{i,k+1}$ is the measured distance between the sense node i and the unknown node. The measurement noise is always present and it can be assumed to be equal to the error V_{k+1} between the measured distance and the predicted distance.

(3) Update the equation

Kalman gain must meet the Gaussian white noise [14,15]. Compare the measured distance $Z_{i,k+1}$ and the predicted distance $\hat{Z}_{i,k+1}$. If the difference is within the Kalman gain region, then the measured distance $Z_{i,k+1}$ can be considered sufficiently accurate. Then, the predicted coordinates $(\hat{x}_{k+1}, \hat{y}_{k+1})$ and error covariance P_{k+1} are updated by measured distance $Z_{i,k+1}$.

3.3 Information collaboration unit

The information collaboration in the system is reflected in the following three aspects:

(1) In the improvement of BIM, the participants of the project work together based on the BIM platform to

communicate and negotiate changes, and it can view the project work process and security status information in real time.

(2) In WSN, there are often multiple sense nodes that simultaneously perceive the target, while different types of sensors have different sensing ranges, perceptual accuracy, and perceived attribute categories. Therefore, it is necessary to effectively combine the target information of multiple sources, obtain necessary information from the cooperation of multiple nodes, and perform the sensing and processing of the collaborative information.

(3) The comprehensive information obtained can be collaboratively displayed in the form of working status icons in the display interface and updated in real time, so that the participants can fully grasp the working information.

3.4 Security Early Warning Unit

In the safety early warning unit, before the work officially begins, the on-site technicians deploy the corresponding sensor nodes, and then the team leader selects the work, clicks the start button, and the working state is in progress. Once the safety hazard is detected during the construction process, the system automatically displays its risk level, at the same time, the task is aborted until the security issue is resolved, and the start button is re-clicked to continue the work until it is successfully completed. The warning value should be set before the work starts. For the monitoring object, the team leader should use WSN to obtain the location information of the object in real time, and reasonably set the warning value according to the specific situation and characteristics of the work.

In addition, different risks should have different countermeasures. When it is low risk, the team leader should communicate directly with the person responsible for solving the safety problem in time; when it is medium risk, the team leader should communicate with the safety management personnel to view the location of the hazard source in the BIM model and negotiate with each other to develop solutions. When it is high risk, the team leader and safety management personnel shall jointly request the project manager of the construction unit, and the team leader shall publish the safety problem information in real time in improve the BIM so that the participants of the project can communicate online and develop countermeasures to ensure the smooth progress of the project.

4. ENGINEERING APPLICATION CASE

This paper simulates the subway construction safety warning model based on the improved BIM and WSN subway construction. Figure 4 shows the classification of dangerous areas around the subway construction and its corresponding prohibition behavior. Through the display interface, it is convenient to select monitoring points for data interaction, data management, and timely release of warning information.

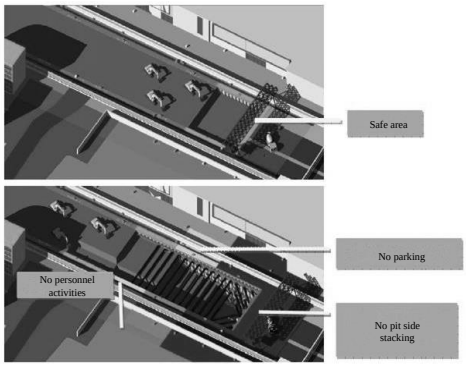

Figure 4 Classification of dangerous areas around subway construction and its corresponding prohibited behavior

In the early warning model proposed in this paper, the final planner of the construction unit and other participants of the project enter the improved BIM unit through the user interface to fully build the production, process, and state models, and then the program interface is used to connect the improved BIM to the security early warning system. Then the field personnel deploy sensor nodes to sense and co-process the information of the monitored objects in real time. Once the team leader on the construction site finds a safety hazard, he should immediately notify the BIM to stop the work and visually displays the risk level in the corresponding area of the BIM model, so that the participants can keep abreast of the work safety status and eliminate security risks.

Due to the dynamic changes of the construction site environment and the changes of the project, the information perceived by the node in real time and the information in the BIM model are continuously supplemented and updated, and finally the safety information database of the construction project is established, which provide complete data support while providing a basis for safety management and decision making.

The construction project safety early warning system covers the whole process from information acquisition to information processing and processing, finally to the collaborative application, which helps to achieve efficient and comprehensive security warning of construction projects.

5. CONCLUSIONS

The project safety warning system based on improved BIM and WSN is designed to make up for the shortcomings of current subway construction site safety management. It can visually display the safety monitoring process and safety status, and acquire and transmit monitoring object information in real time, so that all parties can communicate and exchange project safety information online, and formulate countermeasures in a timely manner, thereby reducing the incidence of on-site accidents and fully realizing the real-time visualization of construction project safety warnings.

REFERENCES

[1]Jürgen Melzner, Sijie Zhang, Jochen Teizer, et al. A case study on automated safety compliance checking to assist fall protection design and planning in building information models. Construction Management & Economics, 2013, 31(6): 661-674.

[2]Solihin W, Eastman C, Yong C L. A framework for fully integrated building information models in a federated environment. Advanced Engineering Informatics, 2016, 30(2): 168-189.

[3]Eadie R, Browne M, Odeyinka H, et al. BIM implementation throughout the UK construction project lifecycle: An analysis. Automation in Construction, 2013, 36(1): 145-151.

[4]Chae S, Yoshida T. Application of RFID technology to prevention of collision accident with heavy equipment. Automation in Construction, 2010, 19(3): 368-374.

[5]Peterson F, Hartmann T, Fruchter R, et al. Teaching construction project management with BIM support: Experience and lessons learned. Automation in Construction, 2011, 20(2): 115-125.

[6]Riaz Z, Arslan M, Kiani A K, et al. CoSMoS: A BIM and wireless sensor based integrated solution for worker safety in confined spaces. Automation in Construction, 2014, 11(45): 96-106.

[7]Gurevich U, Sacks R. Examination of the effects of a KanBIM production control system on subcontractors' task selections in interior works. Automation in Construction, 2014, 37: 81-87.

[8]Kim Y W, Ballard G. Management Thinking in the Earned Value Method System and the Last Planner System. Journal of Management in Engineering, 2010, 26(4): 223-228.

[9]Perotti J M, Lucena A R, Mullenix P A, et al. Wireless Sensor Network. Proceedings of SPIE - The International Society for Optical Engineering, 2017, 2015(1129): 16.

[10]Varga L O, Romaniello G, Vučinić M, et al. GreenNet: An Energy-Harvesting IP-Enabled Wireless Sensor Network. IEEE Internet of Things Journal, 2017, 2(5): 412-426.

[11]Ren D J, Shen S L, Cheng W C, et al. Geological formation and geo-hazards during subway construction in Guangzhou. Environmental Earth Sciences, 2016, 75(11): 934.

[12]Pan J S, Dao T K, Pan T S, et al. An improvement of flower pollination algorithm for node localization optimization in WSN. Journal of Information Hiding & Multimedia Signal Processing, 2017, 8(2): 486-499.

[13]Xu Q, Ren C, Yan H, et al. Laser sensor based localization of mobile robot using Unscented Kalman Filter. IEEE International Conference on Mechatronics and Automation. IEEE, 2016: 1726-1731.

[14]Chen Z, Zou H, Jiang H, et al. Fusion of WiFi, smartphone sensors and landmarks using the Kalman filter for indoor localization. Sensors, 2015, 15(1): 715-732.

[15]Yousefi S, Chang X W, Champagne B. Mobile Localization in Non-Line-of-Sight Using Constrained Square-Root Unscented Kalman Filter. Vehicular Technology IEEE Transactions on, 2014, 64(5): 2071-2083.

Research on Trust and Cultivation Model of the PPP Project in the Infrastructure

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Abstract: The PPP projects organization is a complex organizational behavior system. The complexity of trust behavior is one of the important dimensions. Therefore, this topic draws on the emerging organization theories such as OB, POS and POB, and studies the trust behavior of PPP projects in Chinese context from the perspective of positive behavior. Research on trust cultivation mode of PPP project is shown in this paper.
Keywords: PPP Project; Trust and Cultivation Model; Infrastructure; Government Insurance

1. INTRODUCTION

The PPP projects advocate a non-confrontational approach and target the "win-win" of governments and investors [1]. Due to the incomplete contractual nature of PPP projects, the relationship-specific investment of investors in PPP projects makes the parties highly dependent on each other and increases their chances of adopting opportunistic behavior (That is, higher transaction risk). The contract theory holds that the incentive of opportunistic behavior on both sides of the transaction is information asymmetry, which can easily lead to moral hazard in the subject, and the negative externality of the loss of benefit in the PPP projects [2]. The project governance theory believes that trust in transactions is an important governance mechanism of information asymmetry, and trust as the most important influencing factor in relational contracts, and one of the most important governance objects in PPP project cooperation governance. The cooperation of PPP projects is inseparable from the rigorous contract, so that the formal contract can be effective, and the existence of trust is indispensable, so that the relationship contract can be fulfilled. And economic activities are always embedded in specific social relations, especially in the context of China's relationship culture. On the basis of institutional construction, the improvement of PPP efficiency needs to be guided by the benign social relationship [3].

The PPP projects organization is a complex organizational behavior system. The complexity of trust behavior is one of the important dimensions. In the PPP project, there are initial trust (that is, trust relationship when starting cooperation) and continuous trust (trust relationship during project operation). The construction of initial trust is affected by multiple factors such as commitment to performance and credit. During the project's continuous phase, the reasons for synergy or conflict are different due to the diversification of roles and positions of the participants, resulting in the dynamic evolution of trust behavior between agents, and trust itself has multidimensional characteristics. At the same time, trust can reduce opportunism, reduce transaction costs such as contracting costs and supervision costs in the process of cooperation, but a high degree of trust will reduce the monitoring behavior of the partner to the other party, but also reduce the formal contract Regulatory effect. On the other hand, trust also creates risks, generating a large amount of sunk costs and opportunity costs [4]. This determines the impact of PPP project trust on the overall organizational effectiveness.

Therefore, this topic draws on the emerging organization theories such as OB, POS and POB, and studies the trust behavior of PPP projects in Chinese context from the perspective of positive behavior [5]. It uses qualitative research, social network analysis, system simulation and empirical research to reconstruct. Identifying the type and dimension of trust, studying the motivation of the formation of trust in PPP projects and driving the realization of the construction objectives of PPP projects, and then putting forward the cultivation mode of trust behavior and the strategy of alienation prevention, are of great significance for building the trust theory of PPP projects and improving the organizational adaptability of PPP projects.

2. A REVIEW OF THE RESEARCH ON THE MECHANISM OF GOVERNMENT AND SOCIAL CAPITAL POSITIVE BEHAVIOR IN PPP PROJECTS

Some scholars have studied the mechanism of positive behavior between government and social capital from the perspectives of principal-agent theory, contract theory and active organization management.

①Principal-agent theory. It is mainly the design of incentive mechanism under the principal-agent theory. VININGAR and others regard the government in the PPP project as the principal and the social capital as the agent. It is argued that setting a reasonable incentive and restraint mechanism in the contract can effectively reduce opportunistic behavior and increase trust. Xu Fei and Song Bo constructed a two-stage principal-agent model, and proposed that government rewards and punishments have a significant positive

impact on improving corporate efforts and enhancing trust, and discussed the role of external supervision and internal incentives. ②Contract theory. From the perspective of the branch of contract theory, the standard contract theory assumes that the contract is complete. This is completely binding on both parties to the contract. Lu Xiaohe believes that under certain conditions, non-contracting beforehand does not limit the execution of the optimal contract. The residual control rights derived from incomplete contracts may promote the efforts of the social capitalists. ③Active organization and management. Including Positive Organization Scholarship (POS) and Positive Organization Behavior (POB). The theory aims to explore the positive potential of employees and promote the healthy development of the organization. The focus of POS research is on cultivating positive elements in the organizational environment and building a rigorous, systematic theoretical foundation in research to achieve the common development of organizations, employees and researchers. Kim and others believe that active organizational behavior has three levels of trust repair on both sides: first, whether the untrustworthy is really untrustworthy; second, if it is really untrustworthy, attributed to the individual or the situation; third, if it is attributed to the individual , the deficiencies of such people reflected can be corrected or solidified. Subsequently, Desmet and others conducted an empirical study on trust repair based on active organizational behavior, and verified KIM's trust repair theory. The two levels of concern of POS and POB are mutual influence and interaction, which can be used to explain the inherent law of organizational trust [6].

It can be seen that the research on organizational trust of PPP projects is still scarce. The above scholars have studied the mechanism of the positive behaviors within and between organizations from the theoretical perspectives of principal-agent theory, contract theory and active organization management, which can provide a reference for the research of this topic.

3. RESEARCH ON TRUST CULTIVATION MODE OF PPP PROJECT

There are some studies that can provide a research basis for the trust cultivation of PPP projects. ①Trust cultivation and organizational effectiveness. Weaving effectiveness is the organization's achievement of multiple goals and the organization's output with the same level of resources with less resources. It is a comprehensive manifestation of the organization in all aspects. Trust can promote effective communication and facilitate cooperation and coordination among all parties involved in the project, thus improving organizational performance. Hu Zhen pointed out that in the PPP project, the trust between the public and private parties is in a U-shaped relationship with the government performance, and the theoretical model of the relationship between trust, special asset investment and government performance in the context of PPP projects is constructed. Based on the analysis of PPP project cases, Khadaroo explained the impact of PPP project bidding plan, equipment management level, financing ability and contract on the VFM value of the project. Yuan Jingfeng obtained the PPP project performance benchmark by benchmarking the relationship between the PPP project performance target and the KPI indicator and the PPP project target level, so as to construct a virtual benchmark PPP project performance evaluation system; Lan introduced the analytic hierarchy process into PPP project management performance evaluation, designed the corresponding evaluation index system by constructing the hierarchical structure model of PPP project performance management, and introduced the corresponding PPP project case to demonstrate the effectiveness of the evaluation index system.②The risk of alienation of trust. However, some scholars have confirmed the complexity of the relationship between trust and performance. The impact of trust on performance may not be a purely linear relationship. A high degree of trust will reduce the partner's monitoring behavior against the other party, and reduce the regulatory effect of the formal contract. On the other hand, trust also generates risks, which generates a large amount of sunk costs and opportunity costs. The higher the level of trust, the more information is exposed to the other party, including its own weaknesses. Due to the limited rationality of people, once the partner is mistaken, it is easy to cause huge losses. Moreover, when the interests of the partners are large enough, and the formal contract is unclear, the probability of opportunism is very large, which seriously threatens the success of the project and causes Too-Much of-a-Good-Thing effect of trust (TMGT effect). Therefore, trust is not as good as possible, and it is necessary to guard against the risk of trust alienation [7-8].

It can be seen that both the influencing factors affecting the organizational effectiveness of PPP projects and the research on the index system are not mature enough [9-10]. Although some scholars have studied the impact of trust on organizational effectiveness, it is not enough to explain how to influence this "black box". Dimensional research on organizational effectiveness, most scholars currently stay at the organizational performance level, and the research on two other key organizational development and organizational success in organizational effectiveness is not enough [11-12]. On the other hand, it also shows that the trust between the government and the social capital party of the PPP project can enhance the organizational effectiveness of the project, and it has the necessity and feasibility of cultivation. Moreover, the existing results show that the organizational trust behavior is a double-edged sword, trust of the PPP project subject is not as good as possible. There may be alienation risks in the process

of implementation. The construction of the cultivation mechanism must clarify the critical point that the trust between the subjects has a positive and negative impact on the organizational effectiveness, and determine the positive effect boundary.

4. REVIEW OF RELATED RESEARCH

(1)The trust behavior of PPP projects is highly complex and needs to be examined from a new perspective.

Traditional engineering management disciplines focus on tools and methodological research, and ignoring the "humanity" research (human and behavioral factors) in engineering project organization. PPP project subject trust is based on individual and organizational behavior of psychology. It has complex system characteristics such as diversity of influencing factors, non-linear emergence of organizational effectiveness, chaos and interaction, easy alienation, mutation and so on, has exceeded the research scope of traditional engineering management disciplines needs to combine the related theories of organizational behavior and active organizational management to examine the nature of the phenomenon of trust behavior, the emergence mechanism of power and the risk of alienation, and improve the effectiveness and stability of the cultivation mechanism.

(2) The current research methods are not rich enough, and it is necessary to conduct in-depth systematic research based on interdisciplinary methods.

In the field of engineering management, the research methods are mostly traditional mathematical deduction and model construction, which are used to study the relationship between specific factors and behaviors at specific time. It is not enough to carry out a comprehensive analysis of the multiple motivations of PPP project trust behavior by qualitative research, nor does it make use of the interdisciplinary advantages of simulation technology and empirical methods and complex system research methods to deeply analyze the essential laws such as trust generation mechanism and effectiveness emergence path, and then do not deeply study the cultivation and alienation prevention of trust behavior among PPP project subjects. Although the research results of predecessors in the field of enterprise management are rich, due to different engineering project problems, it is impossible to directly use it to solve the problem of PPP project subject trust.

In summary, the specificity of the PPP project determines the special connotation of trust behavior, and the behavior has the characteristics of motivation complexity, diversified dimensions and easy alienation.

5. CNCLUSION

Due to incomplete contractual nature of PPP projects, the relationship-specific investment of investors in PPP projects makes the parties highly dependent on each other and increases their chances of adopting opportunistic behavior (higher transaction risk). The engineering industry needs a practical trust cultivation mode and alienation prevention mechanism.

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REFERENCES

[1]Volberda H. W., van der Weerdt N., Verwaal E., et al. Contingency Fit, Institutional Fit, and Firm Performance: A Metafit Ap-proach to Organization Environment Relationships. Organization Science, 2012, 23(4): 1040-1054.

[2]Andres H P. Technology－Mediated Collaboration, Shared Mental Model and Task Performance. Journal of Organizational & End User Computing, 2012, 24(1): 64-81.

[3]Espevik R., Johnsen B. H., Eid J. Communication and Performance in Co-Located and Distributed Teams: An Issue of Shared Mental Models of Team Members? Military Psychology, 2011, 23(6): 616-638.

[4]Mayer R C, Davis J H, and Schoorman F D. An Integrative Model of Organizational Trust. Academy of Management Review, 1995, 20(3): 709 -734.

[5]Tullber, J., 2008, "Trust-the importance of trustfulness versus trustw orthiness", The Journal of Socio-Economics, 37(5): 2059-2071.

[6]Maguire S, and Phillips N. "Citibankers"at Citigroup: A Study of the Loss of Institutional Trust after A Merger. Journal of Management Studies, 2008, 45(2): 372-401.

[7]Bornstein B H, and Tomkins A J. Institutional Trust: An Instruction. In B. H. Bornstein, and A. J. Tomkins (eds.). Motivating Cooperation and Compliance with Authority: The Role of Institutional Trust. NY: Springer, 2015.

[8]Zucker, L. G. 1986, "Production of Trust: Institutional Sources of Economic Structure, 1840-1920", In B.M.Staw &I. L. Cummings (Eds), Researchin Organizational Behavior, 8: pp.53-111, Greenwich, CT: JAL Press.

[9]Rousseau D M, Sitkin S B, Burt R S, et al. Not so different after all: a cross-discipline view of trust. Academy of Management Review, 1998, 23(3): 393-404.

[10]Hartman. The role of trust in project management. Proceeding of the Nordnet Conference. Helsinki, 1999.

[11]LAAN A, NOORDERHAVEN N, VOORDIJK H, et al. Building trust in construction partnering projects: an exploratory case-study. Journal of Purchasing and Supply Management, 2011, 17(2): 98-108.

[12]Bornstein B H, and Tomkins A J. Institutional Trust: An Instruction. In B.H. Bornstein, and A. J. Tomkins (eds.). Motivating Cooperation and

Compliance with Authority: The Role of Institutional Trust. NY: Springer, 2015.

Multidirectional Analysis of Green Public Open Space in Zhengzhou Based on Landscape Ecology Indicators

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Abstract: This study takes the construction goals of park city and sponge city as the starting point. By downloading the latest network map data, ArcGIS is used to calculate the green public open space in the main urban area of Zhengzhou. It uses the landscape ecology software Fragstats to select six indicators,such as PLAND, PD, LPI, ED, LSI, AI, to conduct quantitative evaluation of the landscape pattern of green public open space in different directions and different circles. The evaluation shows that there exists an obvious imbalance in the direction of green public open space in the main urban areas of Zhengzhou, and the landscape ecology indicators in the east and north are significantly better than those in the west and south. In view of 1KM circle indicators, LPI indicator shows the biggest difference, which indicates that imbalance exists in large green public open space, and we should focus on the balanced layout of large infrastructure such as municipal park and district park. Based on the results, this paper puts forward the optimization idea of the landscape pattern of green space, hoping to give full play to the role of green public open space in urban construction and development, and promote the construction of park city and sponge city.
Keywords: Public Open Space; Urban Geography; Landscape Ecology; Park City; Sponge City

1. INTRODUCTION

After more than 30 years' rapid urbanization, China's urban construction is in a period of deceleration and improvement. Since 2013, China has begun to focus on improving urban ecosystem functions to reduce the occurrence of flood disasters, and then the concept of sponge city has been widely used. In 2018, the state leaders of China carried out "highlight the characteristics of park cities, take ecological values into consideration, strive to create new growth poles, and build inland open economic highland". Urban public open space, especially green public open space has been paid more and more attention as the main place of urban function. More and more scholars believe that the balanced development of green public open space can promote the improvement of residents' quality of life and urban functions. [1,2] Its balanced distribution in space is regarded as an important feature of sponge city and park city.

Traditionally, the publicity and openness of space are not well defined at the same time. Because the openness of space belongs to the physical level, while the openness belongs to the social level. The latest network maps have made some progress in these areas. For example, Baidu Map (which belongs to China's largest Internet search company). In its online map, such spaces are represented as green. And through the web crawler program, they can be downloaded, which greatly facilitates the definition and statistics of spatial information.

For the spatial distribution of green public open space, it is very important to make good use of landscape ecology. [3] Landscape ecology regards spatial elements as composed of patches of different sizes and shapes according to certain rules. The spatial arrangement of these patches is called landscape pattern, which determines the formation, distribution and composition of the natural geographical environment, restricts various ecological processes, and is closely related to disturbance, restoration, system stability and biodiversity. With the development of GIS technology, the combination of GIS and landscape pattern software has been widely used in landscape pattern research.

2. EXPERIMENTAL

2.1 Study Area

Zhengzhou is the capital of Henan Province and the central city of the country. The case area is located in the main urban area of Zhengzhou, which is surrounded by four ring roads with a total area of about 202 square kilometers. (Fig. 1.)The green open space data of this area can be downloaded through the web crawler program at present. The case area is chosen as the main urban area of Zhengzhou City, that is, 202km^2 area surrounded by its four ring roads (North, East, South and West). This area concentrates most of the population of Zhengzhou, and has a more regular road network system, so it is very meaningful to analyze it according to the direction and circle layer.

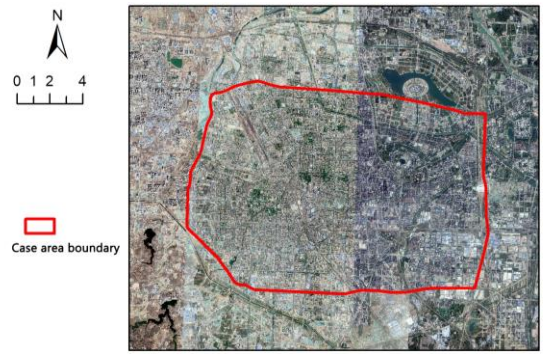

Figure 1 Map of study area and sampling locations

2.2 Method

Firstly, this study downloaded the form of green public open space within the main urban area of Zhengzhou through the crawler program. Through spatial correction and vector transformation, the correct geographic information files are obtained in ARCGIS.

Secondly, with GIS as technical support and landscape pattern analysis method, this research compares several landscape pattern indices at different stages of green patch type level, and realizes the multi-level quantitative analysis of the green open space system in Zhengzhou main cityarea. It divides the green open space system into eight quadrants from the direction (taking the green center as the origin, rotating clockwise, every 45 degrees as a quadrant), and divides the green open space system into 10 quadrants from the gradient. (Fig. 2) Quantitative analysis of pattern changes of green space elements in different directions and gradients was carried out by taking the Green Heart Zijinshan Park as the starting point, from inside to outside, one circle per kilometer.

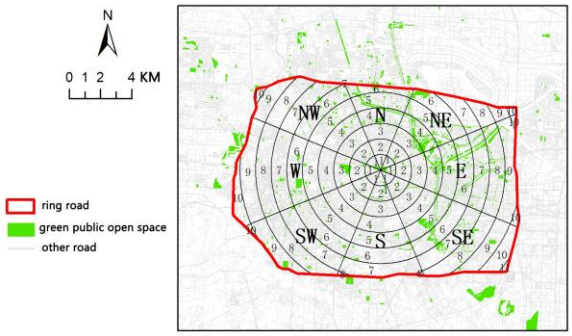

Figure 2 Map of study area and sampling locations

Thirdly, vector files of different directions and layers are converted to 1-meter-precision raster files by ArcGIS to facilitate the use of analysis software. It is very common to use Fragstats to analyze landscape ecological indicators. [4-11] The software Fragstats can be used to analyze these raster files in landscape ecology. [12-16] This paper regards green public open space as the same type of landscape ecology patches. PLAND (Percentage of Landscape), PD (Patch Density), LPI (Largest Patch Index), ED (Edge Density), LSI (Landscape Shape Index), AI (Aggregation Index) and other indicators are selected to analyze the landscape pattern index, which in Class level.

2.3 Landscape Ecology Indicators

PLAND (Percentage of Landscape) quantifies the proportional abundance of one patch type at the class level. It is descripted equals the sum of the areas (m^2) of all patches of the corresponding patch type, divided by total landscape area (m^2), multiplied by 100 (to convert to a percentage); in other words, PLAND equals the percentage the landscape comprised of the corresponding patch type.

$$PLAND = \frac{\sum_{j=1}^{n} a_{ij}}{A}(100) \qquad (1)$$

In Eq.1: a_{ij} = area (m^2) of patch ij.

A = total landscape area (m^2).

PD (Patch Density) is descripted as the number of patches of the corresponding patch type divided by total landscape area (m2), multiplied by 10,000 and 100 (to convert to 100 hectares).

$$PD = \frac{n_i}{A}(10,000)(100) \qquad (2)$$

In Eq.2: ni = number of patches in the landscape of patch type (class) i.

A = total landscape area (m^2).

LPI (Largest Patch Index) is descripted as the area (m^2) of the largest patch of the corresponding patch type divided by total landscape area (m^2), multiplied by 100 (to convert to a percentage); in other words, LPI equals the percentage of the landscape comprised by the largest patch. Total landscape area (A) includes any internal background present.

$$LPI = \frac{\max_{j=1}^{n}(a_{ij})}{A}(100) \qquad (3)$$

In Eq.3: aij = area (m2) of patch ij.

A = total landscape area (m^2).

ED (Edge Density) is descripted as the sum of the lengths (m) of all edge segments involving the corresponding patch type, divided by the total landscape area (m^2), multiplied by 10,000 (to convert to hectares). If a landscape border is present, ED includes landscape boundary segments involving the corresponding patch type and representing ‘ true’ edge only (i.e., abutting patches of different classes). If a landscape border is absent, ED includes a user-specified proportion of landscape boundary segments involving the corresponding patch type. Regardless of whether a landscape border is present or not, ED includes a user-specified proportion of internal background edge segments involving the corresponding patch type.

$$ED = \frac{\sum_{k=1}^{m} e_{ik}}{A}(10,000) \qquad (4)$$

In Eq.4: eik = total length (m) of edge in landscape involving patch type (class) i; includes landscape

boundary and background segments involving patch type i.

A = total landscape area (m^2).

LSI (Landscape Shape Index) is descripted as 0.25 (adjustment for raster format) times the sum of the entire landscape boundary (regardless of whether it represents 'true' edge or not, or how the user specifies how to handle boundary/background) and all edge segments (m) within the landscape boundary, including some or all of those bordering background (based on user specifications), divided by the square root of the total landscape area (m2).

$$LSI = \frac{0.25E^*}{\sqrt{A}} \qquad (5)$$

In Eq.5: E* = total length (m) of edge in landscape; includes the entire landscape boundary and some or all background edge segments.

A = total landscape area (m^2).

$$AI = \left[\frac{g_{ii}}{\max \rightarrow g_{ii}}\right](100) \qquad (6)$$

AI (Aggregation Index) is descripted as the number of like adjacencies involving the corresponding class, divided by the maximum possible number of like adjacencies involving the corresponding class, which is achieved when the class is maximally clumped into a single, compact patch; multiplied by 100 (to convert to a percentage). If Ai is the area of class i (in terms of number of cells) and n is the side of a largest integer square smaller than Ai, and m = Ai - n2, then the largest number of shared edges for class i, max-gii will take one of the three forms.

In Eq.6: g_{ii} = number of like adjacencies (joins) between pixels of patch type (class) i based on the single-count method.

max-g_{ii} = maximum number of like adjacencies (joins) between pixels of patch type (class) i (see below) based on the single-count method.

3. RESULTS AND DISCUSSION

From the analysis results, there are obvious differences among landscape ecology indicators in the main urban area of Zhengzhou. From the directional analysis map (Tab. 1), we can see that the northern, Eastern and northeastern regions of the case area have obvious advantages. PLAND and PD reached more than 10 values in the East and northeast. The South and southwest are very low. In the indicators of PD, LPI, ED, LSI and AI, there are high values in the East and north, low values in the South and west. These results indicate that the high-quality green public open space resources in Zhengzhou are mainly concentrated in the eastern, northern and northeastern parts of the city. These areas are mainly newly built areas, which have the advantage of backwardness. The old urban areas and villages in the West and South need to be reformed urgently in order to increase green public open space.

Table 1. Landscape Ecology Indicators Tables of Different Directions in Case Area

Direction	PLAND	PD	LPI	ED	LSI	AI
N	9.3092	12.3502	1.0211	50.064	14.5334	98.7171
NE	10.3005	6.9973	1.3707	40.13	14.3845	99.0636
NW	3.1575	7.9946	0.2509	21.3782	15.868	98.341
S	2.7104	3.6817	0.2967	15.1403	10.2897	98.7039
SE	5.6941	9.0431	1.031	34.9608	21.0485	98.515
SW	2.8288	4.65	0.4988	16.0974	13.0443	98.6643
W.	3.7459	5.6221	0.8332	16.8388	13.2474	98.9102
E	10.1052	13.0626	0.5923	63.3433	28.3748	98.4636

From the circle analysis map (Tab. 2), we can see that some landscape ecology indicators in the case area show wavy development trend from inside to outside. Among these indicators, LPI is the most obvious, while LSI and PD are not very different. This shows that at the circle level, the distribution of large-scale green public open space in Zhengzhou is the most uneven, reminding planners to pay attention to ensuring the balanced layout of large-scale open space.

Table 2. Landscape Ecology Indicators Tables of Different Circles in Case Area

Circle Number	PLAND	PD	LPI	ED	LSI	AI
1	9.3101	9.2324	3.337	37.6522	5.5675	99.1535
2	4.3132	10.0802	0.446	31.7961	12.1105	98.2535
3	5.0212	6.3027	1.5252	22.1677	10.6556	98.9111
4	9.0735	11.6868	0.7028	47.1533	19.1999	98.7102
5	7.7273	11.141	1.1614	42.9306	21.5134	98.6109
6	7.8822	9.3765	0.846	38.5356	20.3985	98.7816
7	4.4514	8.5452	0.3071	30.6044	21.495	98.286
8	3.8978	5.489	0.4892	23.2493	16.4202	98.5328

9	2.9442	5.0787	0.5983	14.5261	11.3187	98.7715
10	1.6666	7.3728	0.1801	17.7105	9.9868	97.3418

4. CONCLUSIONS

Through this study, the following conclusions are found:

(1) As the network map data has been classified in the early stage and has similar characteristics with remote sensing data, it can be fully utilized, studied and analyzed. The disadvantage of data from mapping sites is that they are slow to update, so the future researchers can regularly crawl cyberspace to test deeper time-space regulations.

(2) The pattern of green public open space in different directions in Zhengzhou is very different. The reconstruction of the old city should be coordinated with the construction of the new city.

(3) In terms of the layers, the large volume of green public open space has the biggest spatial difference. While increasing the green public open space of small volume, we should pay more attention to the construction of large-scale municipal and district park green space, or reserve the site.

These conclusions are helpful to provide construction ideas and optimization schemes for Park Cities and Sponge Cities.

5. ACKNOWLEDGMENT

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REFERENCES

[1]F.Z. Wang, On the Optimization of Urban Opening Spatial System in Chinese Cities, Human Geography 2005, 20 (2): 1-8+113.

[2]F.Z. Wang, S.N. Wang, M. Li, Dynamic evolution and optimization of green open space in Luoyang, Geography and Geo-Information Science, 2012, 31(7): 1209-1223.

[3]J.X. Yan, J.F. Zhang, and Y. Han, Fragstats Based Study of Urban Green Space Landscape Pattern in Handan City, Journal of Chinese Urban Forestry, 2018,16(2): 21–24.

[4]K.R. Campbell, S.M. Bartell, C.M. Krohn et al, A comparison of landscape structure inside and outside the gates: Analysis of the regional landscapes of four US Department of Energy facilities using US Geological Survey quadrangle maps and FRAGSTATS, International Journal of Environmental Technology and Management, 2003, 3(3-4): 219-277.

[5]Q.Z. Yu, Z.L. Zhang, and B. Gao, Study on the Changes of Landscape Pattern in Nansihu Wetland Based on RS and FRAGSTATS, Forest Resources Management, 2013(1): 108-115.

[6]F. Yang, Q.G. Zhou, and X.Y. Zhang, Analysis of Landscape Pattern of Changshou District of Chongqing Based on ArcGIS and FRAGSTATS, J Chongqing Technol Business Univ. (Nat Sci Ed), 2012, 29(12): 95-99.

[7]X. N. Guo, X.N. Liu, and Y.B. Song, Study on the Landscape Pattern Dynamics Based on Fragstats in Dongfang City of Hainan, Central South Forest Inventory and Planning, 2016, 35(1): 30-33+52.

[8]X. Fang, Y. Fang, Analysis on Spatial Pattern of the Coastal Area of Pearl River Estuary Based on GIS and Fragstats in Landscape Scale, Hubei Agricultural Sciences, 2012, 51(4): 841-842.

[9]Z. H. Yang, Landscape Pattern Analysis of Hainan Natural Meadow in China Based on Fragstats and Thematic Mapper, Journal of Landscape Research, 2012, 4(6): 13-14.

[10]S.Lamine, G.P. Petropoulos, and S.K. Singh, et al. Quantifying land use/land cover spatio-temporal landscape pattern dynamics from Hyperion using SVMs classifier and FRAGSTATS. Geocarto International, 2017: 1-17.

[11]D. Mao, Y.C. Zhang, S.L. He, et al. Evaluation of Urban Multi-Scale Landscape Ecological Pattern Based on Open Space Classification: A Case Study in Xinxiang, China, Applied Ecology And Environmental Research, 2018, 16(5): 6787-6799.

[12]Z.H. Yang, Analysing fragmentation in vulnerable biodiversity hotspots in Tanzania from 1975 to 2012 using remote sensing and fragstats, Nature Conservation-Bulgaria, 2016, (16): 19-37.

[13]J.A. Kupfer, Landscape ecology and biogeography: Rethinking landscape metrics in a Post-FRAGSTATS Landscape, Progress In Physical Geography, 2012, 36(3): 13-14.

[14]N. Midha, P. K. Mathur, Assessment of Forest Fragmentation in the Conservation Priority Dudhwa Landscape, India using FRAGSTATS Computed Class Level Metrics, Journal of Landscape Research, 2010, 38(3): 487-500.

[15]Y. Long, J. Yang, and X.J. Liu, Space dynamic evolution and characteristics of urban fringe based on gis and fragstats landscape level, Electronic Journal of Geotechnical Engineerin, 2014, 19(Z5): 17455-17463.

[16]G.L. Raines, Description and comparison of geologic maps with FRAGSTATS - Computers and Geosciences, 2002, 28(2): 169-177.

Stakeholder Breakdown Structure and Factors Influencing Stakeholder Breakdown Structure

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Abstract: Interest in stakeholders has grown considerably since Freeman's (1984) seminal work "Strategic Management: A Stakeholder Approach" was published. The interactions and interrelationships between stakeholders largely determine the overall performance of a construction project, and have the crucial responsibility for delivering a project to successful completion. An important component of stakeholder management is stakeholder analysis. The case study was conducted in Zhengzhou city of China. The main objective was to carry out stakeholder analysis using Microsoft Excel, considering the data's collected from the project execution team using questionnaire. During data collection the key stakeholders were identified, to know how to manage them and for quality improvement. Analyze the results using the software Microsoft Excel and modeling of stakeholders is to be done. Finally validate the models stakeholder breakdown structure. These findings may mainly reflect the stakeholder management environment in the respective regions of project implementation.
Keywords: Stakeholder; Stakeholder breakdown structure (SBS); Analysis; Influence and Efficiency

1. Introduction

The important factor in the development of construction industry is human resource. Therefore, understanding the stakeholders' behavior is very much important to improve the production efficiency. Changes in the stakeholder's productivity in construction industry can naturally make a great impact on the national economy and productivity[1]. Lack of wages, lack of quality material, lack of safety, lack of skill and communication barriers are mainly creating psychological stress to the stakeholders. It will affect the stakeholders' production efficiency. Research on stakeholders has grown since freeman's seminal work "Strategic Management; A Stakeholder Approach" was published in 1904. Since construction is a labor intensive industry, labor power is the only productive resource. Therefore, construction productivity mainly depends upon human effort and performance[2]. The objective of this project is to create stakeholder breakdown structure and factors that influence the stakeholder breakdown structure. So, the outcome can be used by international industry and provide guidance to construction managements for effective utilization of stakeholder force, thus assisting in achieving a reasonable level of competitiveness and cost effective operation[3].

1.1 Objectives

The main objectives of the study are,to give proper shape to internal and external stakeholder in stakeholder breakdown structure to assess the problems of stakeholders to recognize the power level of stakeholders.

Scope of Stakeholder Breakdown structure

The main scope of the project is to create the breakdown structure of stakeholders and the factors influencing stakeholder breakdown structure. The stakeholder breakdown structure is carried out to easily identify the position of stakeholders in the project[4].

Types of Stakeholders

Internal stakeholders: Stakeholders, who directly influence the project. Example: Managing director, Labor, site

Engineer, project manager.

External stakeholder: Stakeholders, who indirectly influence the project. Example: local community, banking

Sector.

1.2 Methodology

1.2.1 Literature Survey

Various research papers on the subject were reviewed. From this literature, the key factors relevant to the research Objectives were identified. Based on the key points, structured questionnaire was prepared.

1.2.2 Design of Questionnaire

The Questionnaire was designed as a tool for the assessment and identification of stakeholder breakdown structure and factors influencing stakeholder breakdown structure. The factors Considered are communication, attitude, satisfaction and relationship between the stakeholders. The questions prepared can relate the real time problems of stake holder with the current practice.

Distribution of Questionnaire

The questionnaire survey was conducted in various construction sites. The main aim was distribution of the Questionnaire to people, who are at various levels of internal stake holding in the organization. The questionnaire was taken to identify the problems of

those people, through their response, and to rectify with proper solution, which in turn increases the production efficiency. The questionnaire was administered to 2 managing directors, 4 project managers, 4 project engineers and 40 Labors[5].

2. Factors Influencing Questionnaire

2.1 Stakeholder Breakdown structure (SBS)

There are four levels in stakeholder holder breakdown structure (SBS). The first three are the main levels and it cannot be changed to some extent while in level fourth the desired stakeholder can be added to it.

2.2 Level of stakeholder breakdown structure

First level is Stakeholder

Second level is internal and external stakeholder

Third level is client and government

Fourth level (the division of client and government)

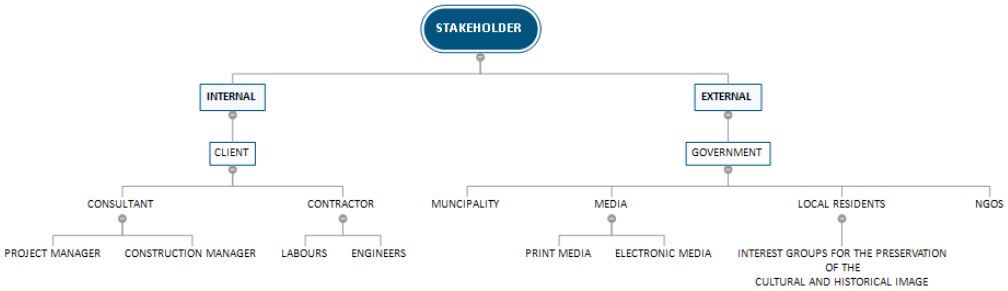

Fig.1 Stakeholder Breakdown Structure (SBS)
Source: Conceptualized from Literature Review

Data Analysis with Microsoft Excel

Stakeholder breakdown structure (SBS)

The data is analysis is done into two charts. The first chart consists of the analysis of stakeholder breakdown structure[6]. Here the questionnaires filled by different respondents agree with stakeholder breakdown structure given in fig.1. The percentage of Agree is 46%, while others are shown in fig.2. It is conclude from the respondents that the stakeholder breakdown structure is correct and will be helpful to place the stakeholder easily in construction projects. Factors influencing stakeholder breakdown structure[7].

Willing to work in a team, Stakeholder breakdown structure, Communication, satisfaction, responsibility, attitude, relationship, and understanding.

According to the above factors the questionnaire were distributed among respondents[8]. Below is the respondents response to this questionnaire and agree with the above factors of this stakeholder breakdown structure[9]. It means that stakeholder breakdown structure is efficient and can be applied in daily construction works[10].

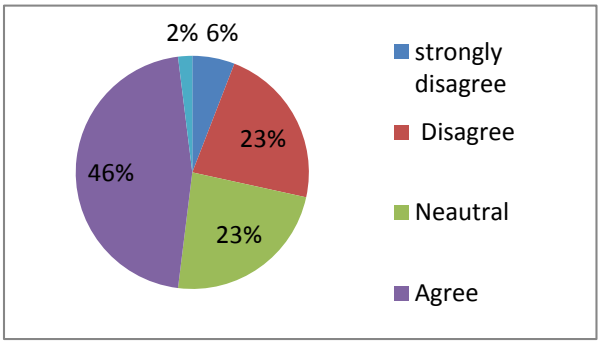

Fig.2 Stakeholder breakdown structure (SBS)

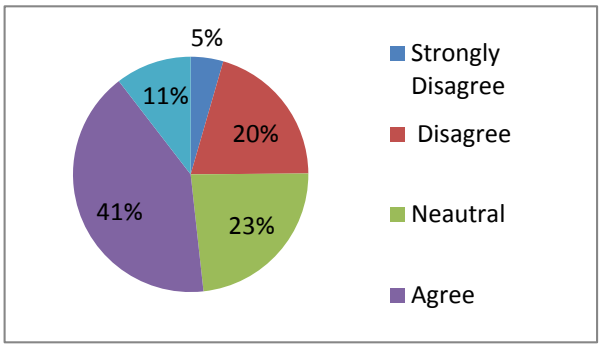

Fig.3 Factors influencing stakeholder breakdown structure

3. Conclusion

It is concluded that the break down structure is workable and will be help full in findings of stakeholders in project. One can easily understand the position of stakeholder. If some problem arouses in construction project one can easily find that stakeholder while going through stakeholder breakdown structure without wasting too much time in finding. Once the stakeholder is identified it will be easy to solve the problem.

The lack of communication between internal and external stakeholder causes delay in project. The change in government officials, due to their transfer is the main reason for the lack of communication. The stakeholder must satisfy from the work he is performing in the project. It can be forced to do the work. Every stakeholder must be responsible for the work otherwise the project will be delayed and causes cost overrun and poor quality.

Various steps can be taken to reduce these problems. The main step is that, the government should provide a clean
Brochure about the project. This should be done before the start of the project. The government should discuss about the Project with the public, so as to prevent further clashes with the local residents. Following these steps, we can reduce the Problems faced during the construction process, and the time delay can be avoided.

References :

[1]Freeman and R.E, Strategic management: A stakeholder approach. Boston: Pitman/Ballinger, 1984.
[2]R. Phillips, Stakeholder theory and organizational ethics: Berrett-Koehler Publishers, 2003.
[3]P. Ganesh Prabhu, Study on Impact of Internal Stakeholder in Government projects, International Journal of Civil, Structural, Environmental and Infrastructure Engineering Research and Development (IJCSEIERD)ISSN(P): 2249-6866; ISSN(E): 2249-7978, Vol.7, Issue 3, Jun 2017, 25-34.
[4]P. Ganesh Prabhu, Study on Influence of Stakeholder in Construction, International Journal of Engineering Technology, Management and Applied Sciences (IJETMAS) ISSN 2349-4476 Vol. 4, Issue 6, June 2016, 31-45
[5]Shiv Kumar S - Modeling and Managing Stakeholder's Power and Influence for Quality Improvement in Construction Projects - A Case Study at "Jaipur Metro"SSRG International Journal of Civil Engineering (SSRG- IJCE) volume 2 Issue 4 April 2015.
[6]Sarah Nash, Ezekiel Chinyio, Rod Gameson, Subashini Suresh "THE DYNAMISM OF STAKEHOLDERS POWER IN CONSTRUCTION PROJECTS" In: Egbu, C. (Ed) Procs 26th Annual ARCOM Conference 6-8 September 2010, Leeds, UK, Association of Researchers in Construction Management, 471-480.
[7]Christine Räisänen, Per-Erik Josephsson and Bert Luvö "Stakeholders views and experiences of leadership education in construction: suggestions for improvements "Published by Elsevier B.V. This is an open access article under the CC BY-NCND license Procedia Economics and Finance 21 (2015) 540–547.
[8]Terry H.Y. Li, S. Thomas Ng, Martin Skitmore "Conflict or consensus: An investigation of stakeholder concerns during the participation process of major infrastructure and construction projects in Hong Kong" Habitat International 36 (2012) 333e342.
[9]Ka Yan Mok, Geoffrey QipingShen, Jing Yang "Stakeholder management studies in mega construction projects: A review and future directions"Science DirectInternational Journal of Project Management (2014).
[10]Jing Yangc, Geoffrey QipingShena, ManfongHoa, Derek S. Drewa, XiaolongXueb "Stakeholder management in construction: An empirical study to address research gaps in previous studies" Science Direct International Journal of Project Management 29 (2011) 900–910.

Research on Data Visualization Analysis System Based on Real-time Database

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Abstract: In view of the application characteristics of the data visualization analysis system based on real-time database, starting from the overall structure of the system, through the analysis and comparison of a large number of references, this paper first introduces the overall structure of the data visualization analysis system based on real-time database, and secondly, from the real-time historical database. The design of data visualization analysis system based on real-time database is analyzed from six aspects: platform construction, process flow reproduction, historical trend analysis, real-time and historical data query, equipment operation and maintenance management and statistical process control analysis. Then, the design of data visualization analysis system based on real-time database is studied. Finally, the positive impact of the application of data visualization analysis system based on real-time database on users is summarized in the form of concluding remarks, hoping to provide effective reference for software developers through this study.
Keywords: Real-Time Database; Data Visualization Analysis; System

INTRODUCTION

In recent years, with the continuous attention and attention paid by the Internet industry to the development of data visualization analysis system based on real-time database, higher requirements have been put forward for the development of data visualization analysis system based on real-time database. This topic has become the focus of the Internet industry. In order to maximize the development level of the system, we should attach importance to the understanding and understanding of the overall structure of the system on the one hand, and the design of the system on the other hand. Besides, we should also attach importance to the display of the system's operation effect, in order to effectively enhance the data visualization analysis system based on real-time database. The quality and efficiency of development play an important role.[1]

1. THE OVERALL STRUCTURE OF DATA VISUALIZATION ANALYSIS SYSTEM BASED ON REAL-TIME DATABASE

The whole structure of data visualization analysis system based on real-time database is divided into two important parts, namely, data acquisition layer and data storage and analysis layer. The data acquisition layer is mainly used to collect instrument information data such as metering station, processing station and oil well station. The accuracy and reliability of the collected information data, data storage and analysis layer is mainly used to store the collected information data. The stored information data mainly includes two types, namely, the automatic well station information stored in relational database and the real-time historical data stored in real-time historical database. That is to say, the data visualization analysis system is set up on the basis of relational database and real-time historical database.

2. DESIGN OF DATA VISUALIZATION ANALYSIS SYSTEM BASED ON REAL-TIME DATABASE

Usually, in order to develop a powerful and applicable system, we must do a good job in the early stage of system development, and the data visualization analysis system based on real-time database is no exception. Next, from the following aspects, the data visualization analysis system based on real-time database is introduced. The design process is introduced in detail to deepen the understanding and understanding of the design process of data visualization analysis system based on real-time database.[2]

(1) Construction of Real-time History Base Platform

The construction of real-time history library platform is the core content of the system in the development process. Therefore, relevant software developers must do a good job in the construction of real-time History Library platform. Usually, once the real-time database is effectively combined with the SCADA system in Cainan Oil Field, it can provide real-time data for the oil field management. This will help to provide a real, reliable and safe data platform for the smooth development and application of data visualization analysis system on the one hand, and on the other hand. It plays a vital role in effectively realizing the timeliness and efficiency of oilfield management information.[3]

This system mainly uses GE's real-time historical database, and GE's real-time historical database's data acquisition function is mainly realized by distributed means. Moreover, GE's real-time historical database uses C/S structure. Therefore, the real-time historical database has very remarkable characteristics. First, the running ring. Second, it is very convenient and efficient to store data. Thirdly, it has a very powerful

client data processing capability. Fourthly, it can provide users with a graphical interface. Fifthly, it can support WEB technology very well. Thus, GE's real-time history database is the best database for enterprise information management system to connect. The management interface of GE's real-time history database is shown in Figure 1.

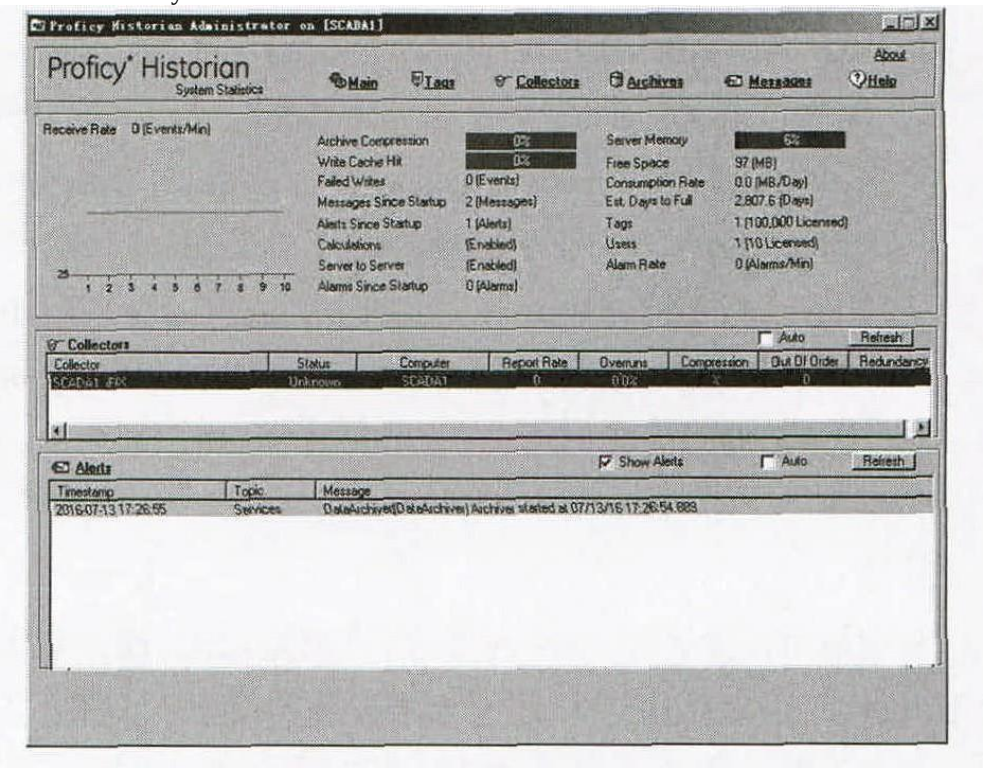

Figure 1 GE Real-time History Database Management Interface

(2) Reproduction of process flow

In order to realize the establishment of data visualization analysis system, relevant software developers need to adopt process flow reproduction to realize the reproduction of system development process. In this process, relevant software developers should keep the original style of SCADA system well according to the overall style of the picture. At the same time, in the process of collecting all real-time parameters, China needs to go through the following links: water well online process, oil well online process and station online process.

(3) Analysis of Historical Trends

Relevant software developers use the form of curve drawing to display all the data stored in the historical database in seconds and links, and finally display the historical trend visually and intuitively in the form of curve graph, which provides an effective reference for the analysis of historical trend. At the same time, the analysis and operation of historical trend need to adopt We. B mode, and the client set up login rights, so as to effectively protect the data stored in the database information.

(4) Real-time and historical data query

Relevant software developers can give full play to the powerful function of database engine driver of the system by applying RTIP system. Then through the interface of GE's real-time historical database [4], the query system of SQL statements is established. According to the difference of query conditions, different query conditions are selected and classified. Real-time and historical data are queried in the form of cable, so as to obtain historical data efficiently, and user data interaction is realized through WEB reproduction.

(5) Equipment operation and maintenance management

Usually, in order to ensure the continuity of safe production effectively, it is necessary to continuously improve the safety, stability and reliability of core equipment. For pumping units, in order to ensure the normal, stable and safe operation of oilfield production, it is necessary to effectively use the "equipment operation and maintenance management" module for the whole pumping unit installation. Then, according to the statistical data table [5], the reasons for the failure of pumping unit equipment are analyzed, and effective solutions are found. In addition, it is necessary to make accurate statistics of the automatic shutdown status and frequency of each well. Then, according to the scale, the statistical data results can be visually displayed in the form of pie chart or histogram, so that the statistical data can be clearly seen through pie chart or histogram. The downtime trend of every well every day.

(6) Statistical Process Control Analysis

Statistical process control analysis, as its name implies, mainly refers to the application of statistical

analysis technology to real-time monitoring links in the field of enterprise product production, so as to accurately distinguish the normal fluctuation and abnormal fluctuation of product quality, and then alarm the situation of abnormal fluctuation [6], which is conducive to production management. Managers find abnormal products in time by alarm sound, and adopt a series of effective solutions to solve abnormal problems, so as to restore the stability of product production, which plays an inestimable role in improving the quality of product production.

Through the application of "Statistical Process Control Analysis" module, the crude oil quality can be effectively analyzed and controlled. Then, according to the alarm trend chart, the parameters affecting the quality can be scientifically controlled by detailed statistics. Then, the quality and efficiency of product production can be improved by periodic inspection. Figure 2 is a unification. The process control analysis chart is calculated.

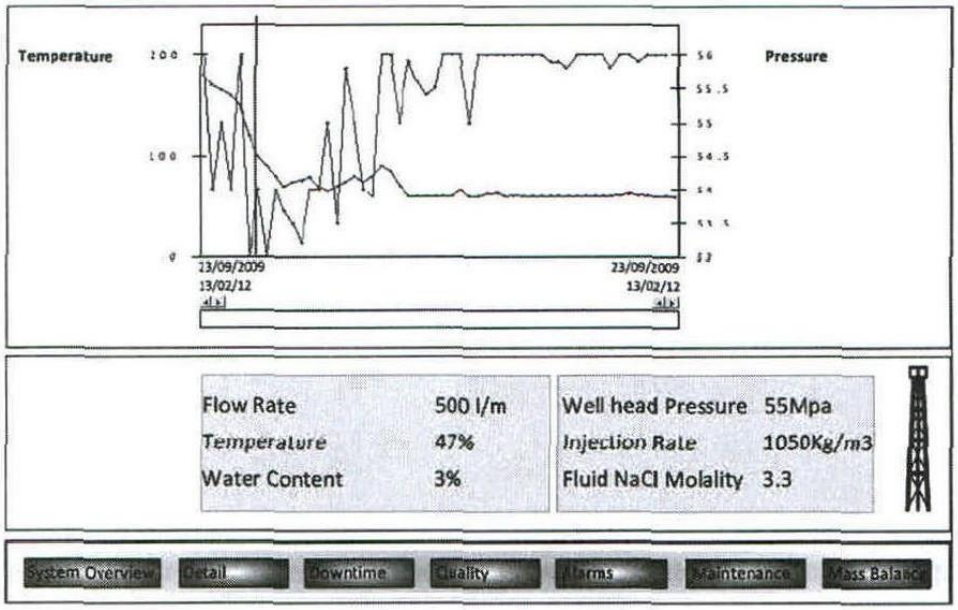

Figure 2 Statistical Process Control Analysis Chart

3. OPERATION EFFECT OF DATA VISUALIZATION ANALYSIS SYSTEM BASED ON REAL-TIME DATABASE

Data visualization analysis system has been widely used in Cainan oilfield enterprises. Aiming at the information management needs of Cainan oilfield enterprises, it provides a very systematic data information management platform for the enterprise, which effectively solves the problems of product quality in production management and improves the credibility of the enterprise. Information management quality and management efficiency play an active role in promoting.

Concluding remarks:

To sum up, through the scientific and reasonable establishment of data visualization analysis system, the conversion of real-time data, historical data and relational data can be realized, and the transformed data can be displayed in the way of personalized information display. This way, on the one hand, it can better provide reliable information for enterprises. Real on-site process data, on the other hand, also effectively promote the development of enterprise management to the direction of intellectualization, thus maximizing the management level of enterprises, so as to achieve healthy and sustainable development of enterprises.

REFERENCES:

[1]Ye Kanglin. Data visualization analysis system based on real-time database. Computer simulation, 2017 (1).

[2]Tan Yang-sen, Nie Rui, Fan Yanqin, et al. Real-time data visualization method for flight test. China Science and Technology Information, 2015 (21): 35-37.

[3]Liu Wenming, Yang Jun, Zhu Jianqi, et al. GIS Real-time Data Visualization Research. Mapping and Spatial Geographic Information, 2015 (3): 31-33.

[4]Pan Dong. Visualization system of HTTP data analysis based on real-time data stream processing. 2016.

[5]Sun Jinsheng. Research on data visualization technology and its application in educational information database. Hefei University of Technology, 2006.

[6]Yinhong. Research on Key Technologies of Visual Data Model for Operational Simulation Entities. Nanjing University of Technology, 2009.

Research on Teaching Mode Based on Mobile internet plus's Mathematical Physics Method

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Abstract: "Mathematical Physics Method" is a basic course for science and engineering majors in major universities. It involves abstract concepts, difficult to remember formulas, numerous theorems and complicated methods. Therefore, it is recognized as a course with large difficulty coefficient [1]. With the continuous development of multimedia technology and the gradual popularization of mobile Internet technology, it has a significant impact on the learning methods of modern students. They prefer to use the Internet, computers and other tools to assist the learning of courses. For all major universities, in order to adapt to the new teaching situation, innovative teaching mode is an important topic to be solved urgently. Through the analysis and research on the teaching mode of mobile internet plus's mathematical physics method, this paper hopes to provide some help for the current teaching mode reform.
Keywords: Mathematical and physical methods; Internet technology

Teaching mode in recent years, mobile Internet technology has developed rapidly and gradually spread to every corner of human social life. Almost all social activities of people cannot do without the support of mobile Internet technology, and teaching activities are no exception. Information-based education was put forward as early as the 1990s. In addition, the course "Mathematical Physics Methods" involves abstract and complicated contents. In order to improve the teaching quality, it is an inevitable choice for universities to adopt the teaching mode based on mobile internet plus's mathematical physics methods.

First, the application background of mobile internet plus mathematics and physics teaching mode.

1. THE "INTERNET+EDUCATION" TEACHING MODE HAS PROMINENT ADVANTAGES.

With the development of mobile Internet technology, "internet plus" is rapidly carrying out in-depth integration with various industries and constantly creating new business models. In order to cater to the new educational situation, major universities have launched a "Internet+Education" teaching model. "Mathematical Physics Method" is an important basic course for engineering majors. Its main learning content is commonly used mathematical methods in physics, which plays a connecting role in professional teaching. Through the study of this course, it can not only lay an important foundation for students' subsequent courses, but also guide students to use mathematical thinking methods to solve physics and engineering problems, and at the same time improve the ability of abstract modeling of practical problems [2]. In addition, the study of this course will also help students form a good way of thinking and lay a solid foundation for further study in the future. This subject is abstract, complex and can better accomplish the teaching objectives with the help of Internet technology.

2. THERE ARE DRAWBACKS IN THE EXISTING TEACHING MODE OF MATHEMATICAL PHYSICS METHODS.

Facing the changes in the educational situation, the traditional teaching mode has shown its relatively insufficient side. First, the one-way teaching method, in the traditional teaching mode, when carrying out the task of knowledge transmission, the teacher outputs one-way and the students receive passively. The teaching activities become the "one-man show" of the teacher, and there is almost no two-way communication between the teacher and the students. Second, monotonous teaching methods. In the traditional teaching mode, teachers mostly adopt the teaching method of "chalk+blackboard". For today's information age, it is almost impossible to complete in a limited time without the aid of modern educational technology and facing a large number of knowledge infusion tasks. Third, students have cognitive bias towards the curriculum and lack motivation to learn. In the process of implementing the traditional teaching mode, emphasis is placed on theory and light on practice, emphasis is placed on the cultivation of logical thinking, and neglect is placed on the cultivation of practical ability. As a result, students have never really realized the real practical value of the course, and it is difficult to stimulate students' interest in learning [3]. Fourth, some teaching materials need to be innovated. With the changes of the times and the expansion of knowledge, some contents of the course can no longer meet the needs of students. Major universities need to pay special attention to how to integrate modern knowledge with the teaching contents of the course in the course development process.

3. THE TEACHING MODE OF "MATHEMATICAL PHYSICS METHOD" NEEDS TO BE INNOVATED

URGENTLY.

With the adjustment of professional knowledge structure and the reform of personnel training programs in many colleges and universities, the number of hours for practical courses is gradually increasing and the number of hours for theoretical courses is gradually decreasing. For this discipline, learning becomes more difficult. In addition, with the changes in the social environment, students' learning methods have also changed. They are keen on learning with the help of computers, networks and other tools, and expect complex formulas and abstract concepts to be expressed visually through the intervention of the Internet. Facing this situation change, the teaching mode based on mobile internet plus's mathematical physics method came into being. This teaching mode gradually highlights its advantages in the process of teaching practice. It makes "Mathematical Physics Methods" a lively and interesting course and can effectively improve the teaching quality.

Second, the exploration of teaching mode of mobile internet plus mathematical physics method.

Combination of traditional and modern methods.

In the "Internet+Education" environment, in order to achieve the best teaching effect, it is a good idea to promote the combination of traditional teaching methods and modern teaching methods. Due to the particularity of the course "Mathematical Physics Methods," the "course+chalk" model is indispensable, but the application of modern teaching methods cannot be ignored. For knowledge that needs to be memorized, blackboard writing is an effective means for teachers to teach and explain to students. First, in blackboard writing teaching, teachers can supplement blackboard writing content at any time according to the actual situation of students, and flexibly grasp the retention time of blackboard writing content according to the speed of students taking notes. Second, through blackboard writing, teachers can sort out the teaching contents and highlight important contents in the process of blackboard writing, so as to guide students to think actively and help students to remember, understand and consolidate the knowledge they have learned in time. For abstract and complicated contents, multimedia is suitable for teaching. First, multimedia can transform obscure theoretical knowledge into visual and visible graphics to help students understand. Second, through multimedia, you can cooperate with flash to make animation demonstration, which can make the teaching content more vivid and interesting [4]. Therefore, in order to obtain an efficient teaching effect, universities must adopt the teaching mode of traditional teaching methods as the main and modern teaching methods as the auxiliary.

Combination of traditional teaching and visual teaching.

In the "internet plus" environment, science and technology companies have continuously developed a large number of high-quality teaching software, such as Mathlab, Mathematic, etc., making the dream of visual teaching in major universities a reality [5]. In order to adapt to the new teaching form, these teaching software in the process of development, give full consideration to the acceptance of students, the program is simple and easy to operate. First, in the teaching process of the course, teachers can use graphics or animation to visualize the calculation results of different problems, which can directly show mathematical and physical problems to students. Second, with the help of these teaching software, the problems involved in the course such as calculation, transformation and numerical solution can also be easily solved. Third, the school can set up a teaching website on the subject of "mathematical and physical methods" and set up teaching modules such as teaching arrangements, online courses, curriculum resources and academic exchanges on the website. Students can learn, self-test and self-consolidate on the website. Teachers can learn about students' confusion on the website and participate in interaction and answering questions.

Combination of face-to-face teaching and online learning.

In the "internet plus" environment, it becomes easier to innovate the teaching mode. The organic combination of face-to-face teaching and online learning can give full play to their respective advantages and effectively improve the teaching quality. Under this teaching mode, it is necessary to comprehensively consider the teaching elements of online teaching and traditional classroom, and reasonably design the teaching implementation mode according to the teaching content. Make the traditional classroom teaching content and online learning content interspersed with appropriate proportion coordination, so as to achieve the perfect match between teaching content and implementation mode, and give full play to the advantages of online teaching comprehensive cloud platform in teaching information exchange, homework management and other aspects [6]. The teaching mode of combining face-to-face teaching and online learning has expanded the teaching form of the course. Face-to-face teaching can realize face-to-face communication with students, online learning and online access to massive teaching resources. This diversified teaching method pays attention to the actual effect of the teaching mode and can effectively improve the teaching quality of the course.

Combination of practical teaching and network interaction.

In the "internet plus" environment, teachers can use the Internet to carry out practical teaching. First of all, knowledge can be taught through network technology, and practical teaching can be carried out by using teaching APP, micro-classes of curriculum teaching

resource database and animation, so that students can more intuitively grasp the operation details. Secondly, you can use network software, platforms and WeChat, microblog, QQ and other software to interact and communicate with students, expanding the space and time for practical teaching. Finally, we can use the test module, homework module and evaluation module of the "Mathematical Physics Method" practical teaching software to deeply understand the students' learning situation and answer questions online for the knowledge difficulties. The teaching mode of "internet plus Mathematical Physics Method" attaches importance to improving the interactive effect in class. It mainly relies on smart phones and mobile Internet to complete the interactive communication between teachers and students in class, so as to improve students' initiative in learning and participation in class. The teaching activities mainly include students' check-in, courseware discussion, practice tests, evaluation feedback and other links. Introducing modern information equipment into classroom teaching and making them an important auxiliary tool in classroom teaching will help to improve the interaction effect between teachers and students, mobilize the classroom atmosphere, stimulate the enthusiasm of students, and add a lot of interest to the originally boring knowledge of mathematics and physics.

Third, the implementation effect of mobile internet plus mathematics and physics teaching mode.

In the process of practice, the teaching mode based on mobile internet plus's mathematical physics method has shown great advantages. For teachers, through the use of teaching software, abstract and complex knowledge can be converted into intuitive and interesting graphics to facilitate students to fully understand classroom knowledge; through guiding students to study online and offline synchronously, students' learning progress can be mastered in real time, which is convenient for students to consolidate and practice. Teachers can also search a large number of teaching information resources through the Internet to help students complete the transfer and expansion of knowledge. For students, they can choose to use computers, networks and other tools to learn, and all difficult problems can be communicated with teachers online. The use of teaching software and multimedia makes originally boring knowledge interesting and students no longer reject learning. The setting of the exercise detection module can enable students to fully realize their understanding of the course content and adjust the learning progress in time. For the major universities, through the implementation of this teaching mode, the teaching effect has been significantly improved and the teaching quality has been continuously improved, which has prepared the conditions for the cultivation of talents in universities. This shows that "Internet+education" is the inevitable trend of future education reform in colleges and universities.

4. Conclusion

In today's era, the in-depth development of mobile Internet information technology has also had a broad and profound impact on the direction of education reform in China. As an important basic course for engineering majors, "Mathematical Physics Methods" plays an important connecting role in the establishment of students' knowledge framework. The vigorous development of "internet plus" technology has opened up a new way for the innovation of teaching mode of this discipline. This teaching mode not only changes the teaching methods of teachers, but also changes the learning methods of students. Faced with the huge amount of information resources, teachers need to guide students to make rational use of mobile Internet messages, obtain appropriate learning resources, and give full play to the positive role of mobile Internet technology in education. The teaching mode based on mobile internet plus's mathematical physics method is a brand-new development trend in the education field, and also provides a development idea for the deep integration of other industries and "internet plus".

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REFERENCES

[1]Yu Yuanqin, Chen Shouwan. Exploration on the reform of teaching mode of mathematical physics methods under the new situation. Journal of Hefei University of Technology (Social Science Edition), 2013, 27(05): 129-132.

[2]Gao Huiyun, Wang Xiaoli. Exploration on Diversified Teaching Mode of Mathematical Physics Methods. Shandong Industrial Technology, 2013, (06): 7-18.

[3]Cao Binzhao, Mei Zhonglei, Li Yuee. Exploration of the teaching mode of "Mathematical Physics Method" in the basic course of electronic information. higher education of sciences, 2009, (03): 102-105.

[4]Qin Mi, Tan Guangxing. Teaching Reform Practice of Mathematical Physics Methods. Educational Modernization, 2017, 4(01): 40-41.

[5]Huang Jiang, Yan Huang, Xia Lixin. "Research on Reform and Practice of Classroom Teaching Mode of Mathematical Physics Methods. Journal of hunan university of science and engineering, 2015, 36(10): 16-18.

[6]Wu Zhaoyun, Ma Xiaolu, Li Li, Zhu Hongyu, Zhang Yueying. Reform of diversified teaching mode of mechanical principles and design based on internet plus. Journal of Higher Education, 2019(14): 75-77.

Microscopic mechanism and Countermeasures of corrosion fatigue cracking of 25Cr2Ni2MoV high strength engineering steel

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Abstract: The corrosion fatigue cracking of 25Cr2Ni2MoV high strength engineering steel is caused by the interaction of hydrochloric acid medium and alternating stress, which requires the reasonable selection of high strength steel for fracturing pump. This paper introduces the basic knowledge of corrosion fatigue, explains the mechanism of corrosion fatigue of 25Cr2Ni2MoV steel, and expounds the generation and propagation of corrosion fatigue cracks of 25CrNi2MoV steel, which provides a basis for judging the use of high strength steel for fracturing pump in hydrochloric acid and the rational selection of steel.
Keywords: 25Cr2Ni2MoV steel; Corrosion fatigue cracking; Alternating stress; Secondary cracking

25Cr2Ni2MoV steel has been widely used in many high strength projects at present. Attention should be paid to corrosion fatigue cracking in the use process to avoid its adverse effects on the project.

1. OVERVIEW OF CORROSION FATIGUE

Corrosion fatigue refers to the failure and fracture of a substance under the action of alternating stress and corrosive medium, which causes serious damage to components and is one of the important ways to cause material failure. It is difficult to determine the specific time and location of its occurrence. Passivation state of metal materials, activation state of metal materials can occur, in nickel-based alloys, low-alloy steel, carbon steel and other non-ferrous alloys can occur. Fracturing pumps generally use high-pressure steel such as 30CrNi2MoV, 43CrNi2MoV, 25Cr2Ni2MoV, 42CrMo, which has strong corrosion resistance. Corrosion fatigue behavior of high strength steel should be studied because of the influence of corrosive medium and cyclic load during operation.

2. CORROSION FATIGUE MECHANISM OF25CR2NI2MOV STEEL

The slip zone and pitting corrosion pits are the source of corrosion fatigue cracks under cyclic loading. After the slip zone is produced, the phenomenon of squeezing and extrusion will occur, and the material will have uneven micro-potential. Among them, the high potential of the anode at the extrusion point will dissolve first in the medium of hydrochloric acid. With the interaction of hydrochloric acid and cyclic stress, pitting pits will appear at the preferential dissolution site, and cracks will gradually expand under this effect until the final fracture occurs. It can be seen that in hydrochloric acid solution, 25Cr2Ni2MoV shows a slip zone preferential dissolution model.

The corrosion fatigue life of 25Cr2Ni2MoV is analyzed in hydrochloric acid solution medium. The relationship between cyclic stress and corrosion fatigue life is inverse. When cyclic stress increases gradually, the corrosion fatigue life decreases gradually. Therefore, it is required that the stress concentration of components should be reduced to a certain extent in the actual use of fracturing pumps. Compared with other types of steel, the corrosion fatigue life of 5Cr2Ni4MoV steel is relatively higher, and the corrosion fatigue performance of 5Cr2Ni4MoV steel is relatively better in hydrochloric acid resistant medium.

The specific concentration of hydrochloric acid solution also affects the corrosion fatigue life. The concentration of hydrochloric acid medium is inversely proportional to the corrosion fatigue life of 5Cr2Ni4MoV steel. When the concentration increases gradually, the corrosion fatigue life decreases accordingly. However, the reduction range is lower than that of cyclic stress.

3. GENERATION AND PROPAGATION OF CORROSION FATIGUE CRACKS IN25CR2NI2MOV STEEL

The failure specimens of 25Cr2Ni2MoV steel show that there are cracks parallel to the fracture surface, and the cracks increase with the distance from the fracture surface. Surface pitting is the origin of corrosion fatigue cracks in 25Cr2Ni2MoV. The mechanism of pitting is mainly caused by cyclic loading and the stress is concentrated. The fracture surface is mainly cracked, and some secondary cracks are also produced. Some secondary cracks will branch under cyclic stress, and the depth will deepen gradually. The fatigue fracture morphology of 25Cr2Ni2MoV steel in hydrochloric acid solution is intergranular, and there are more dimples in the fast fracture zone which is directly pulled off.

Under 20wt.% hydrochloric acid solution and 292MPa stress condition, 25Cr2Ni2MoV steel presents typical intergranular fracture morphology. The river pattern will appear on the small plane of

grain boundary, and some plastic deformation phenomena will occur with the propagation of cracks. In 20wt.% hydrochloric acid solution, 25Cr2Ni2MoV steel will have secondary surface cracks and more pitting pits. The nearer the place with the greatest stress is, the higher pit density is. The pit density of slip zone will be dissolved first. The highest density is at the place with the greatest stress, which is the densest pit. With the distance getting farther, the pit density decreases.

In view of this dissolution fracture principle, when 25Cr2Ni2MoV high strength steel is used in hydrochloric acid solution, the time for prolonging the occurrence of slip zone and the density of slip zone should be reduced. In the design, the stress concentration should be reduced reasonably and the structure of fracturing pump should be designed reasonably. In order to improve the mechanical properties of high-strength steels, high-strength steels with better mechanical properties or fine grains of high-strength steels are used in the design. The corrosion fatigue life in hydrochloric acid medium is affected by the original austenite grain size, i.e., the microstructure. With the grain refinement, the mechanical properties of materials, such as yield strength, are also improved. The corrosion fatigue life in hydrochloric acid medium and the fatigue strength of steel in air can be improved simultaneously.

The corrosion fatigue cracks of 25Cr2Ni2MoV steel were etched by acid solution. It was found that the corrosion fatigue cracks gradually propagated along the grain boundaries of the original austenite. When the vertical direction of growth was encountered, the grain boundaries would be hindered. The intergranular growth needed more energy support. Under the continuous loading of alternating stress, the grains would be pulled out directly and pierced to a certain extent. Crystal cracks.

Compared with the atoms at the cementite phase boundary, the original austenite grain boundary atoms have higher activity, so the grain boundary will be corroded seriously. So crack comparison

REFERENCES

[1]Li Zhuzhou, Ju Jia, Wang Zhangzhong, et al. Study on Microstructure and impact toughness of 23crnimov forged steel brake disc. Hot working process, 2017, (18): 79-82.

[2]Jiang Baojun, Chen Geng, Chen ronghua, et al. Influence of surface quality and loading mode on high cycle and ultra-high cycle fatigue behavior of clean 42CrMo high strength steel. Mechanical science and technology, 2018, (9): 1450-1458.

[3]Cai Hengjun, Hu Jingfan, song Renbo, et al. Study on the micro mechanism of plastic deformation of 1200Mpa cold rolled dual phase steel under high strain rate. Journal of mechanical engineering, 2016, 52(12): 23-29.

[4]Zhang Nan, Dong Xianchun, Zhang Jianqiang, et al. Study on the relationship between th and the fatigue life of high strength steel q960e used in dynamic load structure under thermal influence in coarse grain area. Shougang technology, 2017, (5): 26.

Application of Information Technology in Intelligent Campus

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Abstract: With the development and wide application of information technology, people's life, learning and working methods have changed significantly. The popularization of information technology provides necessary technical support for the reform and development of China's modern education and accelerates the process of building smart campuses. At present, there are still some problems in the application of information technology in the process of building a smart campus platform. These problems easily restrict the advantages of information technology and the construction of smart campus. This paper elaborates on the specific application of information technology in the construction of smart camp us, clarifies the current problems of smart campus, and comes up with effective measures to solve the problems.
Keywords: information technology; smart campus; application

Intelligent Campus refers to the application of information technology, promoting the connection of various technical equipment on campus, providing intellectualized comprehensive information service platform and personalized customized services for teachers and students. Intelligent campus construction includes teaching environment, campus management and information security system. Each level is related to data statistics and analysis, which makes information technology applied in the construction of smart campus, provides necessary support for the automation work in the construction of smart campus, and provides strategies for schools. For necessary decision-making.

1. INFORMATION TECHNOLOGY IN INTELLIGENT CAMPUS

1.1 Cloud Computing

Cloud computing is a combination of a large amount of data and information, and it is a virtual abstract analysis platform for users. Intelligent campus needs to be able to maintain user information platform when it is stored in the cloud. Based on data security and information management, campus cloud computing is comprehensively analyzed. For example, when the teaching evaluation system combines with cloud computing platform in the operation process, it can promote the information content of the platform to be sorted out effectively, record and evaluate the students' own learning results comprehensively, promote the individualized development of the school teaching situation, and make the school develop better [1].

1.2 Internet of Things

The Internet of Things (IOT) is an information network system based on the Internet, which is finally realized under the condition of its specific function expansion. It promotes the information exchange efficiency of things and things to be more remarkable. Intelligent campus can provide intelligent services for teachers and students under the application of the Internet of Things. Meanwhile, it can carry out intelligent campus services and management, realize information exchange when the Internet of Things platform is applied, and provide an effective carrier for anyone and anything on campus.

1.3 Big Data

Big data refers to a new data management technology. Big data can be used to mine and analyze structured and unstructured data in depth to obtain relevant intelligent decision-making basis. Intelligent campus can effectively meet the needs of the current education and teaching reform under the circumstances of the concrete practice of data co-ordination, and can also promote the school management effect to be more remarkable. Making use of big data in teaching can help teachers to better grasp students' learning habits, make more accurate judgments on students' learning situation, and then select the best teaching plan to improve students' learning performance.[2]

2. PROBLEMS IN INTELLIGENT CAMPUS OF COLLEGES AND UNIVERSITIES

2.1 Insufficient School Infrastructure and Inadequate Awareness of School Administrators

When the construction of smart campus is implemented, the school can provide relatively perfect modern equipment as support. With the progress of science and technology, there are many kinds of modern equipment. More manpower and material resources and funds should be invested. When applied, it can be completed on the basis of cooperation in many aspects. When some school administrators and teachers recognize the construction of smart campus, they have the characteristics of not deep enough understanding, and the role of information technology has not been fully played. Some schools are not scientific and reasonable enough to build smart campuses. The goal of building smart campuses is not

clear, and there are not close links between different systems. As a result, the flow of data and information between systems is not smooth. It will not only waste educational resources, but also reduce the participation of teachers and students in smart campuses. Enthusiasm for construction. At present, the access mode of most schools is obviously backward, the access technology is weaker, and the access mode is not practical. It also causes incompatibility among various systems, data processing is difficult, and data transformation and sharing can not be achieved. To a large extent, it has a negative impact on the application of large data technology in the construction of intelligent campus. Sound [3].

2.2 The Equipment Planning is Unreasonable and The Connection is Difficult

At present, most information platforms lack unified standards in planning and design, which makes it difficult to connect data and information in information platforms, and the equipment can not be better applied. The insensitivity of information systems can not help the study and work of school teachers and students. It can not meet the personalized needs of colleges and universities.

2.3 Data Technology and Management Personnel are Few, and Data Analysis Ability Needs to be Improved

At present, the number of data talents in our country is still unable to meet the demand. There are fewer people with strong data analysis ability in Colleges and universities. The construction of intelligent campus needs these talents. Information technology provides more information data for the development of school management. The information analysis collected has also become the current practice of data information content. The main link of application is that some university staff have not high ability to analyze the content of data and information, which will cause the collected data and information to be submitted directly to the school management in most cases, which will easily reduce the accuracy of decision-making implementation of managers.

3. APPLICATION MEASURES OF INFORMATION TECHNOLOGY IN INTELLIGENT CAMPUS

3.1 Increase Investment in Infrastructure Funds

When the construction of smart campus is implemented, the basic equipment needed mainly includes hardware equipment and software system. Every university needs to be able to integrate with its own situation when it develops. The hardware platform should be integrated and processed concretely. For the school, its current infrastructure should also be further completed. Good, fully and clearly come to the technical platform with prominent informatization characteristics, and determine a unified information standard, which provides the necessary guarantee for the wide application of large data. The construction of smart campus takes a long time and is more complex. In the course of the development of the times, smart campus will also change significantly. Therefore, when deciding on the construction decision of smart campus, schools should have a long-term vision and make more feasible plans according to the relevant content of information technology and cloud computing. Ensure that big data and cloud computing technology effectively meet the needs of information platform construction in specific applications. At the same time, promoting the school management can strengthen the understanding of the importance of building a smart campus, so that school managers can deeply understand the positive impact of building a smart campus on educational reform and the improvement of educational concepts. Schools should also strengthen the propaganda of promoting the construction of smart campus, so that teachers and students can effectively. Stimulate the advantages of intelligent campus [4].

3.2 Integrating a Variety of New Technologies in the Light of the University's Own Situation

In the construction of smart campus, the information platform needs to be integrated with the school's development needs, so as to meet the needs of school staff and students, and design a more scientific and reasonable smart campus data platform. With the rapid development of information technology, schools can combine new technologies to ensure the information security of the data platform. Intelligent campus platform construction can promote the school information system to be fully linked together, avoid waste of resources in the process of rational application of information data, and reduce the cost of intelligent campus construction [5].

3.3 Enhancing the Awareness and Technology of Information Security Prevention in Intelligent Campus

Data traceability technology can be effectively used in the prevention and treatment of information security in smart campus. When problems such as lack of data information occur, the application of this technology can make these data information recover in time, thus promoting the integrity and authenticity of data to be guaranteed. In the process of data transmission, it is also necessary to build a standard and unified traditional data channel. Because of different secret level design, we should pay attention to the access rights of campus network platform, enhance the management level of users' rights, and maintain information security. According to the network security risk issues, we should constantly enhance risk prevention awareness, effectively strengthen the level of technical protection, improve new security technologies, and enhance the ability of intelligent campus security protection in an all-round way.

3.4 Training Professional and Technical Personnel and Actively Participating in Institutional Cooperation

The construction of smart campus needs more professional and technical personnel to participate actively. On this basis, we need to realize that the

number of specialized talents in target colleges and universities can not fully meet the needs of school development. Schools should also be able to effectively cooperate with professional institutions and introduce more advanced technologies and products. Based on this, we can meet the needs of the construction of smart campus and promote the higher level of intelligence of campus construction. At the same time, schools should pay more attention to the skill training of relevant staff, improve the technical ability of relevant staff, train more excellent data management personnel, and promote the wide application of information technology in the construction of intelligent campus.

4. CONCLUSION

With the development and widespread application of modern information technology, the construction of campus informatization and the application of intelligent campus data information technology have also made relevant personnel fully aware of the important role of improving intelligent campus planning. Schools should also upgrade their hardware and software according to the specific conditions of schools. And the needs of teachers and students, better application of information technology platform, promote the efficiency of school management under the support of information technology, further improve the quality of classroom teaching, make the school get better development.

REFERENCES

[1] Application of Niu Junzhu.AR Technology in the Construction of Intelligent Campus. Electronic World, 2019 (17): 163-164.

[2] Sun Zhen, Gao Yang. Exploring the Construction of Intelligent Campus in the Context of the New Era. Communication World, 2019, 26 (08): 85-86.

[3] Gao Yang, Guo Hui and Liang Kang. Exploration of Intelligent Campus Construction Based on Big Data Technology. Communication World, 2019, 26 (08): 154-155.

[4] Cheng Hongfei. Research on Intelligent Campus Construction in Big Data Era. Teaching and Management, 2019 (24): 46-48.

[5] Consideration and Discussion on the construction of Rorschach Smart Campus. Information and Communication, 2019 (08): 119-120.

Intelligent Decision Control Theory of Drying System

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Abstract: Grain drying is a complex process of heat and mass exchange. The drying process is affected by material and medium parameters, related to climatic conditions and drying process, and is a biological and chemical process. The grain drying system is a strong non-linear system with large time delay. The time of grain in the drying tower is up to 8 hours. The temperature and humidity of the environment, the temperature and humidity of hot air and the moisture content of raw grain have important effects on the moisture content of the grain out of the machine. For strong nonlinear systems with large time delay, experienced operators can obtain satisfactory control boxes by manual adjustment. Aiming at the grain drying process with the characteristics of non-linearity and complexity, this paper studies the continuous intelligent control system of grain drying, which uses the deviation of water content of grain as the input of the controller. The proportional gain can be adjusted online according to the extreme value of the deviation of water content. Intelligent control can be designed by using virtual instrument development platform and sensors. The experimental results show that the real-time effectiveness of the controller is good.
Keywords: grain drying system; system control

The non-linear characteristics of grain drying process make it difficult to establish an accurate mathematical model. Some drying processes have complex mathematical model structure and difficult to design effective control. Adaptive control theory can identify the controlled objects lacking mathematical model. However, the recursive algorithm is complex and the ice problem of road sticks in the system needs to be solved. The application of error hindrance model of modern control theory in drying control. Intelligent technology has good non-linear control characteristics, but each intelligent control method has some limitations. Fuzzy control needs self-learning of the system to gradually approach the target value. There are many factors affecting grain moisture content during drying, which makes it difficult to guarantee the quality of dried grain. Expert system has better ability in real-time control. The disadvantage of BP algorithm is that the training time is long, and the radial basis function approximation drying process can improve the convergence speed, but the central coordinate is difficult to determine, which limits the application of intelligent controller. The human-simulated intelligent control technology is applied in grain drying to control the moisture content of grain.

1. STUDY ON DRYING SYSTEM OF AGRICULTURAL PRODUCTS

Agricultural products are essential goods for people's daily consumption. The production of agricultural products needs drying treatment. Only after drying can the agricultural products be put into processing and use. In traditional drying, the original rough sunshine drying method is widely used. Water in agricultural products is evaporated by the temperature of sunshine, which is inefficient and the final product is of poor quality. With people's understanding of the relevant knowledge, drying tools, such as natural gas and other fuels, were invented to heat agricultural products manually, and refined artificial methods appeared in the baking room, but the final quality shortcomings still exist. The harmful substances of coal and other fuels will be transferred to crops.

With the acceleration of agricultural mechanization, the use of crop dryers has received widespread attention. At present, drying equipment controlled by single-chip computer is widely used, and semi-automatic perception is supervised by experienced farmers in drying. The temperature control algorithm supplemented by driving PID has certain intellectualization, but it is only suitable for simple variable system.[1]

Correct understanding of drying process of agricultural products plays an important role in drying quality. Water content of each crop has an important impact on drying quality. The chemical changes inside and outside agricultural products have a certain impact on the quality characteristics of drying materials, such as structural characteristics, sensory characteristics, nutritional characteristics, etc. High quality drying is to ensure the quality of agricultural products and to dry crops efficiently and cost-effectively. Drying of agricultural products is a scientific drying process to reduce the moisture content of crops to a certain ratio. During the drying stage of crops, the required temperature and humidity are different, and the ultimate storage humidity of agricultural products is different. Agricultural products have different varieties and drying processes. Current drying equipment is often aimed at drying a certain crop.

Developing a modern, scientific and efficient drying system, using low-cost control chips and software using BP neural network algorithm, make multiple functional modules scientifically constitute a complete and efficient intelligent drying system. Compared with the traditional way, it has a significant improvement in energy consumption, drying effect and so on. It has an important realization for national economic development. Real meaning.

2. DESIGN OF HUMAN-LIKE INTELLIGENT CONTROLLER

The human-simulated intelligent control method was proposed in the 1980s. The model of human-simulated intelligent control uses the production model to study how the structure of the controller can better simulate the function of the expert brain from the macro perspective. The first layer of grain drying humanoid intelligent machine is the operation control level, which is directly oriented to the controlled object. It consists of a feature identifier and a multi-mode controller. The operation controller inputs the characteristic parameters of the information engineering system, such as input and output of the system, into the identifier, and maps the characteristic features of the system to the corresponding control modes by the set of intuitive inference rules of the inference engine. 。 The parameter correction stage is composed of the normal parameter library, and the parameter correction set is used to correct the modal through the feature identifier.

Human-simulated intelligent control valve is not limited by the dynamic drying model. The control strategy is automatically changed according to the water content error, and the process is controlled automatically based on the expert knowledge of grain drying. The algorithm is described by generating rules. Through research and analysis, the control experience is summarized, and the online proportional gain control decision is obtained.

3. REALIZATION OF INTELLIGENT CONTROL SYSTEM

The control system consists of grain dryer, data acquisition card, DC motor speed regulator, DC motor and so on. When the system works, the sensor manually sets the grain species, and the moisture content of grain is detected by the sensor and input into the intelligent controller. The measured moisture content of grain and the set deviation change rate are used as feedback signals. The rotation speed of the discharge electrode is driven by the data acquisition card, and the moisture content of grain is controlled by controlling the rotation speed of the discharge electrode.

The capacitive grain drying on-line divider is used to measure grain moisture content. The probe is connected by cable. The probe is installed on the outer side of the gentle Soviet section. The second side shows grain moisture content. The computer communicates with RS232 serial port.

Using NIUSB6008 data acquisition card, it has basic measurement and control functions. The resolution is 12 bits, the sampling rate is 10 kb/s, and 12 digital input and output channels. Storage and moisture content of grain are controlled by the motor as the actuator. The water content of grain can be changed by controlling the speed of the motor. The electric control system is a DC motor speed control system. The control signal is sent out through the digital output terminal of the data acquisition card. The stepper motor is driven by the driver and the output voltage is adjusted to change the straightness. The armature voltage of the current motor regulates the residence time in the grain desiccant.

The system control software is developed on LabVIEW7.0 platform of NI Company, which is based on graphic programming. On NIUSB data acquisition card and software development platform, according to the requirements of grain drying test and control, the test program is compiled. The main function modules of the drying intelligent control system software include human-simulated intelligent controller and so on [2].

4. CONTROL SYSTEM EXPERIMENTS

The experiment was carried out in drying room of Agricultural University of China by using intelligent algorithm. The corn with high moisture content was prepared before the experiment. The corn with high moisture content was filled into the grain collector of the experimental platform. The computer collected the water content signal of grain. The output value of the controller was obtained according to the rules of human-simulated intelligent control. The change of output voltage of the acquisition card was recorded and the sampling period was completed. After that, the grain with lower moisture content was put in and the experimental steps were repeated. When the detected moisture content of grain is higher than the set moisture content of grain, the motor of grain discharging does not move. When the moisture content of grain is lower than the set value, the displacement screw propeller accelerates the displacement. The experimental results reflect the human-simulated intelligent control rules.

Compared with ideal data curve, the experimental data curve has a certain temperature inertia buffer when heating stops in operation, which will cause a certain temperature difference in drying control. Temperature and humidity have strong coupling, which will have a certain impact on humidity, but the error is within the allowable range. The experimental results are basically consistent with the ideal situation. Design talks about the intended purpose. Compared with the existing typical drying equipment, the drying temperature and humidity curve reflects the superior performance of the system design. The system adopts BP neural network PID control algorithm, which makes the system have the advantages of high

stability, high precision, strong ice-resistance and strong self-adaptability. The design of the drying control system is successful.

The system adopts the improved algorithm combining PID control algorithm with BP neural network. BP neural network PID algorithm has been applied in greenhouse environment. There are not many experiments in crop drying. Greenhouse is a relatively stable control environment, and drying control is difficult. The system adopts BP neural network PID control algorithm, which has the advantages of self-adaptation. It can adjust adaptively according to the changes of human disturbance factors in drying. The rapid development of agricultural science and technology is elaborate. Drying God plays an important role in the development of China.

5. Conclusion

This paper elaborates the combination of single chip computer and improved BP neural network PID control algorithm to realize intelligent drying system, which has many advantages such as high drying efficiency, low cost, simple structure and so on. The use of single-chip microprocessor control is conducive to the design of intelligent products, improve product quality. A humanoid intelligent control algorithm is proposed, which has simple structure and is suitable for grain drying control. The computer control system of grain drying is constructed with NI company's hardware. The system structure is reasonable and has a high degree of automation. A lot of experience and knowledge have been gained from field operation. The feasibility of human-simulated intelligent control scheme lays a foundation for the application of experimental engineering.

REFERENCES

[1] Liu Yuzhang. Design and implementation of data monitoring system for grain drying tower. Harbin Engineering University, 2014.

[2] Lu Xiaorong. Theory and experimental study on intelligent control of grain drying process. Northeast University, 2005.

Research on the Integration of Green Design Concept in Architectural Design

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Abstract: In the process of our country's social and economic development, the construction industry has developed rapidly and its scale has been further expanded. At the same time, people's living standards are gradually improving, and environmental awareness is constantly increasing, which requires higher standards for the construction industry. The construction industry needs to develop in the direction of green, low-carbon environmental protection and sustainable development. In the process of building engineering design and construction, people are paying more and more attention to the concept of green architectural design. Relevant designers need to actively apply the concept of green architectural design, integrate it into every link of architectural design and construction, truly implement the concept of energy conservation, environmental protection and sustainable development, so as to promote the further development of the construction industry. This paper expounds the concept of green architectural design in architectural design, analyses the relevant principles of applying the concept of green architectural design in architectural design, and probes into the application of the concept of green architectural design in architectural design.

Keywords: architectural design; green design concept;

INTRODUCTION

With the development of society, the scale of the construction industry is expanding, but at the same time, there are more serious pollution problems. Pursuing green, low-carbon and environmental protection architectural concept has become the focus of architectural design. However, in the actual construction industry, there are still some construction enterprises do not attach importance to the application of green architectural design concept. In the construction process, a lot of building materials have been wasted, resulting in the rising cost of construction, but also a certain degree of pollution to the environment.[1] In today's social environment, people are more and more actively participating in the practice of low-carbon environmental protection development concept. Green architectural design concept has also received more and more attention in architectural design. To ensure low-carbon, energy-saving and environmental protection of buildings, appropriate building materials should be used in the process of construction, and the design of architectural style and structure should be carried out with green design concept, so as to be able to be human beings. They provide a healthy and efficient living environment. At the same time, through the application of green building design concept in architectural design, it can reduce the waste of building materials, greatly reduce the cost of construction, and effectively protect the environment around the building, which is conducive to promoting the sustainable development of the construction industry.[2]

1. RELEVANT EXPLANATION OF GREEN ARCHITECTURAL DESIGN CONCEPT

With the rapid development of China's social economy and the concept of sustainable development, people pay more and more attention to the protection of the environment and the pursuit of low-carbon and environmental protection in life, especially the development of the construction industry. In today's social context, the concept of green architecture design is the trend of the development of the construction industry, which has an important impact on the sustainable development of the construction industry. The concept of green architecture design also fully reflects people's respect for nature and shows people's pursuit of a higher level of life.[3]

For the green design concept in the construction industry, it mainly involves the green planning, construction and the use of environmental protection materials of construction projects. The selection of building materials and the important content of applying green design concept in the construction links of construction projects are also related to the protection of the relevant environment. Implementing green design concept in these links is also the correct concept of green architectural design.

Under the concept of sustainable development, every industry in society should attach importance to green and low-carbon environmental protection while developing. However, the traditional construction process often produces a large amount of resource consumption, which can not effectively meet the relevant requirements of the concept of sustainable development. By integrating and applying the concept of green architectural design in architectural design, the construction process can be effectively reduced. Resource consumption, through the application of new energy, ensures the full integration of green architectural design concept and architectural design

work, realizes the good economic and ecological benefits of the construction industry, thus promoting the sustainable development of the construction industry.[4]

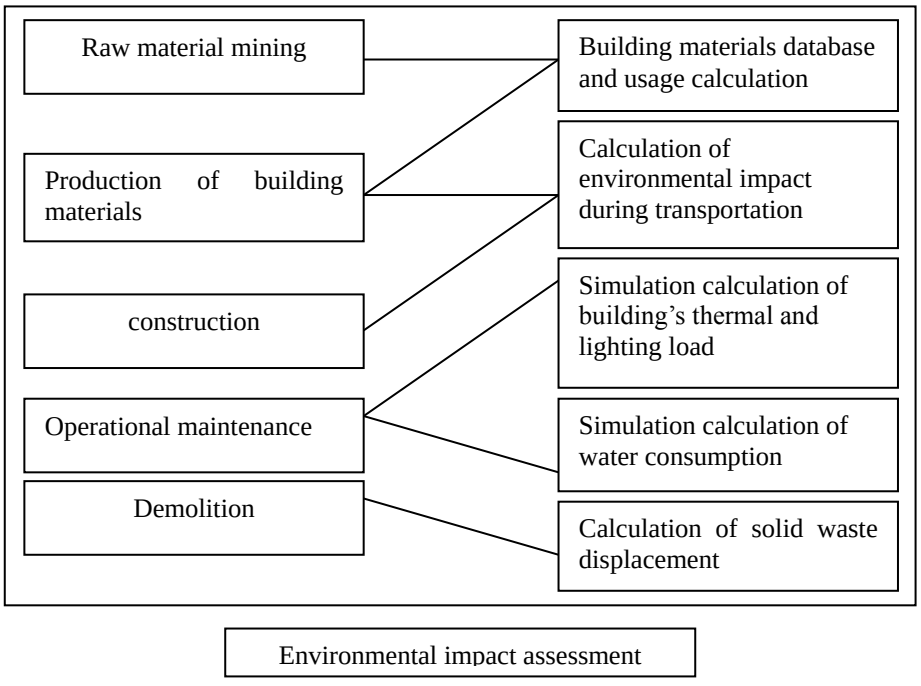
2. RELEVANT PRINCIPLES OF APPLYING GREEN ARCHITECTURAL DESIGN IDEA IN ARCHITECTURAL DESIGN

2.1 Principles of Low Carbon Environmental Protection

In the application of green architectural design concept in architectural design, the most basic requirement is to maximize the use of energy, effectively reduce the pollution of the ecological environment in the construction process, and ensure the efficient use of resources in all aspects of architectural design, so that people and nature can live in harmony. In the process of architectural design, we should follow the law of natural environment development well, and fully consider the natural environment, vegetation coverage and soil conditions around the construction project, so as to ensure the implementation of the green architectural design concept in the process of construction, maximize the protection of the ecological environment around the building, and reduce the related pollutants in the construction process. The degree of environmental pollution. Through the effective application of green building construction materials, reduce the waste of building materials in the construction process, and truly implement the concept of green building design.

2.2 Rationality Principle

In the process of building engineering design and construction, the quality and cost of building engineering should have certain rationality. In the process of construction, if the relevant construction enterprises only pursue the reduction of investment cost too much, it will easily lead to some unreasonable places in the process of architectural design, which will constantly cause the construction rework and increase the frequency of reconstruction, and also affect the construction cycle and the construction quality of the building. At the same time, it is unreasonable to neglect the investment of construction cost if the relevant construction enterprises only pay attention to the quality of construction in the process of design and construction. The so-called rationality principle is that in the process of building construction, whether it is the cost or the quality of the building, in the process of design, we should control within a reasonable range, and choose a reasonable design plan in the process of building design, which fully reflects the concept of green architectural design.[5]



3. THE APPLICATION OF GREEN BUILDING DESIGN CONCEPT IN ARCHITECTURAL DESIGN

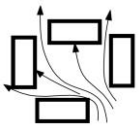
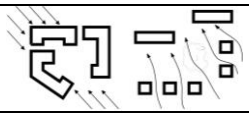
3.1 Making Full Use of Building Material Resources

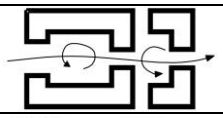
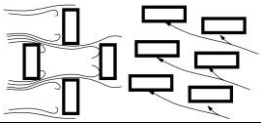
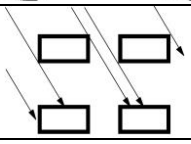
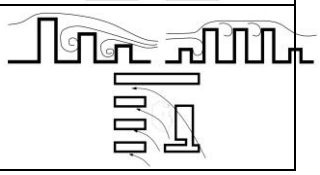
In the process of architectural design and construction, we should make full use of the existing building materials in the construction site of the construction project to avoid waste of surplus materials, so as to achieve the effect of saving building materials. In the process of selecting building materials, the relevant personnel should fully consider the structural characteristics of the building, so as to select the most suitable materials for the building, such as the selection of reinforced concrete structure, the

selection of corresponding reinforced concrete columns, increasing the use rate of concrete, will reduce the use of cement and steel. At the same time, in the process of building construction, integrated construction can be used, which can make full use of the corresponding building materials, so as to conform to the concept of green building design and ensure the environmental protection of building design.[6]

3.2 Links of Planning and Design

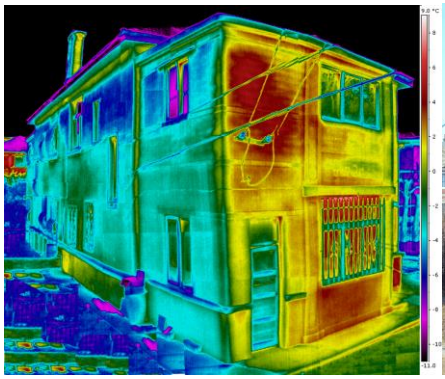
In today's social environment, the concept of green architectural design is one of the more advanced design concepts, which should be fully applied and embodied in all aspects of architectural design. In the design of architectural engineering, the relevant designers should fully integrate the concept of green architectural design and architectural planning, and mainly consider the following aspects in the process of architectural planning: (1) According to the climate environment and topography of different geographical regions in China, fully understand the climatic conditions of the relevant regions, reasonably select the types of buildings and related layout methods, so as to carry out science. Reasonable architectural planning and design. (2) In the process of building planning and design, we should reasonably choose the orientation of the building, and pay attention to building engineering to have good ventilation and lighting, so as to effectively reduce energy consumption in the process of using the building.

Ventilation characteristics	Layout mode
Buildings should be properly spaced to facilitate access wind	
Blocking the dominant wind in winter	

Ventilation characteristics	Layout mode
Conducive to the east-west ventilation of the group	
Conducive to a more uniform overall wind field of the building group	
Conducive to the wind blowing into every building	
Buildings with small height differences are arranged to avoid adverse wind conditions around the building	

3.3 In the Design of Building Structures

In order to get a better application effect of green building design concept in architectural design, we need to optimize the overall structure of the building in the process of architectural design, and effectively meet the relevant needs of people for different buildings. With the improvement of people's living standards, people have higher requirements for the comfort of buildings, which also makes the structure of buildings develop towards a more diversified direction. This requires the relevant designers to fully apply the concept of green architectural design in the process of building structural design, and make rational layout of the structure of buildings, so as to meet the needs of different groups of people for construction. Relevant needs of buildings. By fully implementing the concept of green architectural design in the design of building structures, the consumption of related resources in the construction process can be reduced, and the sustainable development of the construction industry can be effectively promoted.[7]



4 SUMMARY

To sum up, with the concept of green building design getting more and more attention in the architectural design, to ensure the low-carbon, energy saving and environmental protection of the building, it is necessary to use appropriate building materials in the construction process, to design the architectural style and structure with the concept of green design, so as to provide a healthy and efficient living environment for people.[8] Through the application of green architectural design concept in architectural design, it can reduce the waste of building materials, greatly

reduce the cost of building, and effectively protect the environment around the building, thus contributing to the sustainable development of the construction industry.[9]

REFERENCES

[1] Lin Xiande. Green Building. China Building Industry Press: Beijing, 2007.

[2]F Nicol, M Humphreys. Derivation of the adaptive equations for thermal comfort in free-running buildings in European standard EN15251. Building and Environment, 2010.

[3]De Dear R, Brager G S. Thermal comfort in naturally ventilated buildings: revisions to ASHRAE Standard 55. Energy and buildings, 2002,34(6):549～561

[4] Song Dejun. Building environmental control. Nanjing: Southeast University Press, 2003

[5]Guo Fei. Research on passive energy-saving technology and strategy for high-rise residential buildings in Shanghai. Tongji University; School of Architecture and Urban Planning, Tongji University, 2008.

[6] Xu Zheng. Integration and application of green architectural design concept in architectural design. Building materials and decoration, 2019 (20): 72-73.

[7] Peng Bo, Yang Zifu. Brief discussion on the integration and application of green architectural design concepts in architectural design. Residential industry, 2019 (06): 31-33.

[8] Li Hao. Exploration on the integrated application of green architectural design concept in architectural design. Real Estate, 2019 (09): 100-101.

[9] Fu Rui. Brief discussion on the integration and application of green architectural design concept in architectural design. Green environmental protection building materials, 2019 (04): 109.

Nearest Neighbor Sorting Algorithms for Chinese Data Cleaning

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Abstract: With the continuous development of Internet technology, data analysis plays a very important role in various fields of society. In the process of data analysis, people pay more and more attention to the acquisition of a perfect and stable data source. However, real data sources often have redundant, missing, inconsistent and uncertain data, which will have a direct impact on the accuracy of subsequent data mining results and the correctness of relevant decisions. At this time, corresponding data cleaning is needed, and more and more scholars pay attention to the research of Chinese data cleaning. As a data cleaning method, duplicate value cleaning in Chinese originally adopted the traditional nearest neighbor sorting algorithm (SNM) applied to duplicate value cleaning in English. However, due to the differences in semantics and usage habits between Chinese and English, this method can not perform Chinese data very well. Cleaning will result in a great difference between the final cleaning result and the original data. To overcome the shortcomings of the traditional nearest neighbor sorting algorithm, a Chinese data cleaning algorithm based on nearest neighbor sorting is proposed in this paper.

Keywords: Chinese data cleaning; duplicate value cleaning; nearest neighbor sorting algorithm; editing distance

1. INTRODUCTION

In today's information-based society, data shows a rapid growth. Data mining often encounters problems such as data missing, data redundancy, inconsistency and uncertainty, especially data duplication, which has become a problem that can not be ignored in all areas of society. There are many factors in data duplication, such as constraints of relevant conditions, wrong measurement methods and violations of corresponding data constraints when collecting data. Data duplication not only affects the normal process of data mining, but also affects the correctness of subsequent decision-making and duplicates data. Cleaning has become one of the main problems in the field of data cleaning. The technology of data cleaning in English has been mature, but when cleaning Chinese data, the traditional nearest neighbor sorting algorithm applied to English data cleaning can not get better cleaning effect. This is because there are great differences in grammar, semantics and expression between Chinese and English, and this algorithm can not be applied to Chinese data cleaning. Whether there is similarity between synonyms can be effectively judged. According to the above problems, this paper puts forward corresponding improvement ideas, introduces editing distance, and adopts a Chinese data cleaning algorithm based on nearest neighbor sorting. The algorithm can calculate similarity in terms of words, and save the running time of the algorithm. The accuracy of the improved algorithm has also been greatly improved. Effective implementation of Chinese data cleaning.[1]

2. CHINESE DATA CLEANING ALGORITHM BASED ON NEAREST NEIGHBOR SORTING

2.1 Chinese Data Cleaning Based on Nearest Neighbor Sorting

Using the idea of nearest neighbor sorting in data cleaning is a classical method to solve the problem of data traversal. Neighbor sorting algorithm is used to traverse the data set one by one. In the process of comparing similarity, this method needs two comparisons. This method has the corresponding time complexity, that is, N represents the total number of records in the data warehouse. The nearest neighbor sorting algorithm is implemented as follows: in TS, the keywords needed for sorting are selected for its records, and the records in the data set are sorted accordingly according to the selected keywords; the size of sliding window W is m, which starts from the first record and slides downward; and the last one in the window is used. The similarity between a record and the remaining records is calculated in order. After judging the occurrence of duplicate value data, corresponding markers are needed, otherwise the next record is compared in order. The last step is repeated until W is compared with the last record of the current data set, and the whole data cleaning process is completed. Complete the calculation. The idea of using nearest neighbor sorting algorithm is shown in

Thought diagram of nearest neighbor sorting algorithm

By reducing the reliability of the nearest neighbor ranking idea, a certain time complexity can be reduced. In the process of using nearest neighbor sorting algorithm to clean English duplicate values, only the literal similarity of English words can be calculated to achieve the whole sentence similarity calculation, but there is a big difference between

Chinese and English. Applying this algorithm to Chinese data cleaning, obviously it can not achieve good results.[2]

2.2 Nearest Neighbor Sorting Algorithms Based on Editing Distance

The traditional nearest neighbor sorting algorithm has corresponding advantages, but it also has some shortcomings. When there are too many data bars in the data set, the sliding window technology can effectively improve the accuracy, reduce the number of runs to a certain extent, and improve the efficiency of data cleaning. However, there are still some shortcomings. Traditional algorithms pay too much attention to the selection of keywords, which makes keywords become the most important factor in the aggregation process of similar records. The size of sliding window is also difficult to choose. When the window W is too large, it will increase the corresponding comparison time. If the sliding window is too small, it will also accommodate. It can easily lead to the omission of duplicate records. In order to effectively solve the above problems, it is necessary to improve the nearest neighbor sorting algorithm.[3]

There are great differences between Chinese and English in semantics. English semantics comes from words, while Chinese semantics comes from words. Chinese and English are also quite different in the process of sentence splicing. There are no corresponding semantics separators in Chinese sentences, and the semantics of the whole sentence can not be spliced only according to the semantics of a single word. Traditional editing distance algorithm is affected by some factors in the process of calculation. It can be solved by Chinese word segmentation. When calculating editing distance, words are taken as units. On the basis of satisfying the requirement of similarity calculation, it is more suitable for Chinese environment and can effectively improve the speed of calculation. And accuracy.

In the practical application scenario of Chinese, there are still some shortcomings in calculating the editing distance with the idea of word segmentation. For two words which are synonyms, the traditional editing distance algorithm can be regarded as different meanings. So when calculating the editing distance, when the two entries have exactly the same literal form, the editing cost is set to 0; if not, the editing cost is set to 1; according to the synonym library, the editing cost is set to 0 for the two entries which are synonymous with each other; if not synonyms, then the editing cost is set to 0. The cost of editing is 1, which can ensure that the calculation results are more in line with the corresponding requirements.

2.3 Steps to Improve Nearest Neighbor Sorting Algorithms

Based on the idea of Chinese word segmentation and synonym checking, the traditional nearest neighbor sorting algorithm is improved. In the process of input, the data set D with m objects is included, while the output is the number of objects and similar values determined as duplicate values. The specific process of improvement is as follows:

(1) Data set D is sorted according to the selected keywords, and the sorted data set is represented by D'.

(2) In the sliding window of W size, W-1 is used as the basis, and the objects from W-2 to 0 are compared according to the corresponding order.

(3) In the process of comparison, the optimized editing distance algorithm is applied. After Chinese word segmentation, the corresponding thesaurus is introduced. For each corresponding word in the object after word segmentation, the comparison of synonyms is carried out. After judgment, the editing cost is 0.

(4) The initial value of sliding window size is generally 3. By scaling the window size and repeating the above steps, we can get the difference of repeated value cleaning between different size windows.

3. ANALYSIS OF EXPERIMENTAL RESULTS

In this experiment, we use the supplier inventory data set, which has 6 attributes and 1044 data. Comparing the cleaned data set with the original data set, the matching degree of the algorithm can be displayed by calculating the corresponding correct rate. The calculation method is: $n > 0$, where M represents the number of cleaned duplicate value attributes and N is the number of duplicate value attributes in the original data set. Fig. 2 shows the accuracy curves under different w values. When the values of W coincide with the classification of data sets, the experimental results are better.

Accuracy curves with different w values

In the case of repeated data sets, the cleaning accuracy is high. When the proportion of repeated values is about 20%, the accuracy will be reduced. As shown in Figure 3.

Accuracy curves with different repetition ratios under different algorithms

After a series of analysis, based on Chinese word segmentation and synonym checking, the improved nearest neighbor sorting algorithm is more suitable for Chinese data cleaning, and the accuracy is relatively high.

4. SUMMARY

To sum up, the traditional nearest neighbor sorting algorithm can't do Chinese data cleaning very well. Based on the idea of Chinese word segmentation and synonym checking, the nearest neighbor sorting algorithm is improved accordingly. The improved algorithm is applied to Chinese data cleaning, which can achieve better cleaning effect, and can also be effectively improved. The accuracy of text data cleaning.

REFERENCES

[1] Zhang Bacon, Huang Shucheng. A nearest neighbor sorting algorithm for Chinese data cleaning. Computer Applications and Software, 2018, 35(08):

286-288+333.
[2] Zhang Bacon. Research on Nearest Neighbor Sorting Algorithms and Its Application in Chinese Data Cleaning. Jiangsu University of Science and Technology, 2018.
[3] Ye Gull, Zhang Jung, Li Junhuai. Review of Chinese Data Cleaning. Computer Engineering and Applications, 2012, 48(14): 121-129.

Study on the Detection and Analysis of Chenxiang Components in Pu'er Tea

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Abstract: In view of the characteristics of Pu'er tea stale fragrance, starting from the application of single-chip computer in electronic technology, through the analysis and comparison of a large number of references, firstly, materials and methods are introduced from three aspects: materials and main instruments, sample treatment and methods, and gas chromatography-mass spectrometry conditions. Secondly, materials and methods are introduced from three aspects. The experimental results were analyzed from three aspects: the analysis of the components of Pu'er tea stale fragrance, the comparison of the differences between Pu'er tea stale fragrance and other Pu'er tea samples, and the determination of the key components of Pu'er tea stale fragrance. At last, the conclusion of the experiment is summarized in the form of concluding remarks. It is hoped that this study can provide an effective reference for the relevant researchers.
Keywords: Pu'er Tea; Chen Xiang; Ingredients; Detection.

1. INTRODUCTION

In recent years, with the constant attention and attention paid to the detection experiment of Pu'er Tea's Chen-xiang ingredients, higher requirements have been put forward for the detection experiment of Pu'er Tea's Chen-xiang ingredients. Therefore, the topic of "detection and analysis of Pu'er Tea's Chen-xiang ingredients" has become the focus of attention in the agricultural industry. In order to maximize the accuracy and scientificalness of the experiment, we should attach importance to the preparation of materials for the experiment of Pu'er tea stale fragrance composition detection, on the other hand, we should also attach importance to the application of reasonable methods, in addition, we should also attach importance to the experimental results of Pu'er tea stale fragrance composition detection. The analysis plays a vital role in getting more scientific research results for relevant researchers.

2. MATERIALS AND METHODS

In order to improve the quality of Pu'er tea to the greatest extent, 36 purchased samples of Pu'er tea are used as experimental materials. Headspace-solid phase extraction method is used to detect the stale aroma components of Pu'er tea. Next, the process of testing the stale aroma components of Pu'er tea is introduced in detail from the following aspects. In order to deepen the understanding of the experimental process.

2.1 Materials and Major Instruments

The materials used in this experiment are: 36 samples of Pu'er tea purchased, and the main instruments used are as follows: extraction bottle, SPME sampler and solid phase microextraction head [1]. Because the preparation of the experiment directly affects the overall effect of the experiment, the relevant researchers in the early stage of the experiment, according to the experiment. In order to meet the actual needs, it is necessary to prepare the components of the experimental materials and instruments used.

2.2 Sample Treatment and Methods

The 10.00g Pu'er tea sample was weighed by electronic scale and added into the extraction bottle. Then, boiled water of 100 degrees Celsius was added to the extraction bottle to ensure that the ratio of the sample to boiled water was 1:3. Then, the extraction bottle was preheated by alcohol lamp [2]. Finally, SPME sampler and solid phase microextraction head were used. At the same time, the extraction time should be strictly controlled within 1 hour. After the extraction is completed, the extraction solution should be put into the chromatograph. At the same time, the startup instrument should be opened to complete the collection and collation of the extraction data.

2.3 Conditions of Gas Chromatography-Mass Spectrometry

At the same time, in order to maximize the advantages of gas chromatography-mass spectrometry, the temperature of the sample port should be controlled within 250 degrees Celsius. In addition, the temperature of the detector should be controlled within 250 degrees Celsius [3], and the purity of the carrier gas should be controlled at 99.99. % Above; control the gas flow rate at 1 mL/min; set the initial temperature of the capillary column to 50 degrees Celsius, and then maintain it for three minutes [4]. Next, raise the initial temperature of 50 degrees Celsius to 125 degrees Celsius every minute. Finally, MS conditions should be set for the experiment. Usually, in order to achieve MS conditions, the temperature of the ion source should be set to 230 degrees Celsius, the electronic energy used in the

experiment should be set to 70 eV, and the voltage of the electronic multiplier should be set to 350 V.

3. RESULTS AND ANALYSIS

Through the analysis of the test results of Pu'er Tea's Chen-flavor components, we have an accurate understanding and understanding of Pu'er Tea's Chen-flavor components. In order to maximize the accuracy of the analysis of the test results of Pu'er Tea's Chen-flavor components, next, we start with the following aspects to test the results of Pu'er Tea's Chen-flavor components. Detailed introduction.

3.1 Composition Analysis of The Aroma Components of Pu'er Tea

As shown in Table 2, the Chen-flavor components in five Pu'er tea samples are mainly composed of heterozygotes and alcohols, while hydrocarbons, ketones and esters rank second. At the same time, the Chen-flavor components in Pu'er tea samples are related to nitrogen-containing compounds and acids. The content is relatively low [5].

Table 25 Compositions and Relative Contents of Chenxiang in Pu'er Tea Samples

Sample No. Alcohols, Ketones, Acids, Heteroxides, Esters, Nitrogen-containing Compounds, Phenols, Hydrocarbons

2.68 12.56 0.31 31.86 4.67 0.69 2.35 14.02

13.18 8.16/30.3 4.91 1.50 2.7 13.05

16. 35.05 6.15 0.18 21.67 4.81 1.23 3.34 9.29

29.84 6.91/35.68 0.59 0.98 3.67 13.89

36.26 7.16 0.18 17.35 4.39 1.62 3.18 19.51

3.2 Comparison of Aroma Components of Pu'er Tea With other Pu'er Tea Samples

As shown in Table 2, the differences in aroma components between the aloes and other Pu'er tea samples can be seen from the table as follows: Firstly, the content of alcohols in the stale aroma of Pu'er tea is significantly lower than that of ordinary Pu'er tea. Secondly, the content of methyl salicylate in stale fragrance of Pu'er tea is much higher than that of common Pu'er tea samples, the exceeding value is 103.86%. However, the content of succinic acid-methylene-dimethyl ester in stale fragrance of Pu'er tea is 23.98% lower than that of common Pu'er tea samples. Thirdly, 3,4-dimethoxytoluene in Chen-xiang of Pu'er Tea was 37.50% higher than that of common Pu'er Tea, while 4-ethyl-1, 2- dimethoxybenzene in Chen-xiang of Pu'er Tea was 41.56% higher than that of common Pu'er Tea. The content of 1,2-dimethoxybenzene in Pu'er tea was 47.76% higher than that in ordinary Pu'er tea. In a word, it is obvious from the data in the table that the aroma components of Pu'er tea are quite different from those of other Pu'er tea samples.

Table 2 Differences in Aroma Components of Xiangpu'er Tea and Other Pu'er Tea Samples

Average Value of Aroma Components in 5 Chenxiang Puer Teas

Mean Value of 31 Other Pu'er Teas

3,7,11-trimethyl-1-dodecanol 0.18% 0.40%

Cedrol 2.34% 3.44%

Methyl salicylate 1.62% 0.79%

Succinic acid-methylene-dimethyl ester 0.52% 0.68%

3,4-dimethoxytoluene 3.57% 2.59%

4-ethyl-1,2-dimethoxybenzene 4.61% 3.26%

1,2-dimethoxybenzene 3.47% 4.25%

1,2,3-trimethoxybenzene 9.00% 12.30%

3.3 Determining the Key Components of Chen Xiang in Pu'er Tea

Through the analysis of the test results of Pu'er Tea Chen-xiang, we can have a deeper understanding of the key components of Pu'er Tea Chen-xiang. Through the observation of the experimental data, we can clearly see that the content of 1,2,3- trimethoxy-benzene in Pu'er Tea Chen-xiang is much lower than that in ordinary Pu'er Tea samples, while the content of Chen-xiang in Pu'er Tea is much lower. The 4-ethyl-1,2-dimethoxybenzene in Pu'er tea was 41.56% higher than that in ordinary Pu'er tea, and the methyl salicylate in Pu'er tea was 103.86% higher than that in ordinary Pu'er tea. From these data, it can be clearly seen that 3,7,11-trimethyl-1-dodecanol, cedrol, methyl salicylate, 4-ethyl-1,2.- The different contents of dimethoxybenzene and 1,2,3- trimethoxy-benzene affect the concentration and aroma of Pu'er tea to a certain extent.

4. CONCLUDING REMARKS

In summary, the following conclusions can be drawn from the analysis of the experimental results of the detection of Chen-xiang in Pu'er Tea: Firstly, after sensory evaluation of 36 samples of Pu'er Tea, Chen-xiang in Pu'er Tea has obtained more than 90 points of evaluation results, and it is more appropriate to use Chen-xiang in Pu'er Tea as an experimental sample. Secondly, the main components of Pu'er tea are heterozygotes and alcohols. Thirdly, compared with other samples of Pu'er Tea, the content of linalool in Pu'er Tea Chen-xiang is obviously higher, which is also a significant feature of Pu'er Tea Chen-xiang.

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REFERENCE

[1] Aroma constituents of Lu Haipeng, Zhong Qiusheng, Lin Zhi. Chen Xiangpuer tea. Tea Science, 2009, 29 (3):219-224.

[2] Ye Mao. Applying Metabonomics Strategy to Study Pu'er Tea and Its Effects on Human

Metabolism. Shanghai Jiaotong University, 2008.
[3] Changes of biochemical components and antioxidant activity of Qi Kangbiao, Chen Xiaoshan, Lin Ying-Pu'er tea at different storage times.Guangdong Tea Industry, 2013 (5):16-21.
[4] Xue Chen. Study on the effect of raw material grade and storage time on the quality and biological activity of Pu'er tea. Anhui Agricultural University, 2013.
[5] Dong Civilization, Tan Chao, Liu Huarong, et al. Effects of different microorganisms on the physicochemical composition of Pu'er tea at different fermentation stages. Food Industry, 2014 (6):179-182.
[6] Yao Meiqin. Study on the changes of main chemical components in Pu'er tea during storage. Chinese tea, 2013 (6).

Exploration of Telecom Big Data Processing based on Complex Network

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Abstract: With the rapid development of China's economy and the rising level of science and technology, it also creates more opportunities for the development of telecommunications companies. However, due to the increasingly complex network relationship, it also puts forward new requirements and standards for large data processing technology of telecommunications to a certain extent. Under the background of complex network, more and more people pay more attention to the problem of big data processing in telecommunications. If there are defects in the processing, it will inevitably have a serious impact on it. Based on this situation, this paper studies the reduction of large-scale data processing in complex networks in order to improve the effect of large-scale data processing in telecommunications and promote the rapid development of telecommunications enterprises.
Keywords: Complex network; Telecom big data; Processing

In the new era, with the rapid development of information technology such as Internet and cloud computing, big data technology emerges spontaneously. The emergence of big data technology has attracted more and more attention, and also made the society enter the era of big data rapidly. As an important part of information technology, big data has high application value. Therefore, telecom enterprises have made in-depth research on big data technology and made efficient use of big data means, which has achieved good application results. However, with the continuous development of big data, it also increases the pressure of data and management of telecommunications enterprises to a certain extent. Under this background, how to effectively deal with big data has become an effective problem that telecommunications enterprises need to solve. Thus, it is of great practical significance to explore the large data processing of telecommunications in complex networks.

1. APPLICATION OF BIG DATA IN TELECOM ENTERPRISES

1.1 Application of Voice Data Analysis

Under the background of the development of big data technology, voice data is widely used in telecommunication operators. Telecom operators can use voice data to serve their products, so as to analyze the needs of users of products in depth, so as to meet the basic needs of users smoothly, and to improve users'products and services. Satisfaction, in the long run, will inevitably improve the level of service satisfaction of telecommunications enterprises, and promote the improvement of consumer credit consumption [1].

1.2 Application of Network Traffic Analysis

In the continuous development of society, the application of network traffic has become an important way of people's daily life, and people have put forward higher requirements and standards for network traffic. Based on this background, if telecom operators want to improve users'satisfaction with network traffic services, they will inevitably use big data technology hands. Secondly, we should reconfigure and optimize the network traffic resources according to the actual situation. At the same time, we should analyze the network log to adjust the network effectively, so as to promote the improvement of network quality.

1.3 Application in Enterprise Management Decision-Making

At present, in the market economy environment, the competition between enterprises is becoming more and more fierce. In order to develop rapidly, it is necessary for enterprises to formulate reasonable development strategies. Therefore, in the operation and development of enterprises, with the help of big data technology, the paper objectively analyses the market competition, the level of development of enterprises themselves and so on. According to the analysis results, it makes sound management decisions and puts forward effective management measures, so as to promote the improvement of enterprises'core competitiveness and make a great progress for enterprises. To lay a solid foundation.[2]

1.4 Application in Business Innovation of Enterprises

In order to make great progress, enterprises need to take the road of innovation and development unswervingly. When enterprises innovate, they need to protect users'privacy in an all-round way. If innovation is based on infringing users' factors, it will lose the significance of creativity. For this reason, enterprises should make rational use of big data technology means, make strict confidentiality to users'privacy, process their information, use the form of providing information services to achieve

innovation, and further promote the long-term development of enterprises.

2.CHALLENGES OF TELECOM BIG DATA

Nowadays, the business of telecommunication enterprises is increasing and the scale of enterprise network is expanding, which also increases the difficulty of large data processing to a certain extent. Traditional databases are also facing the increase of the number of data storage, making it difficult for them to expand linearly, reducing the level of large data processing, and not developing effectively. Superiority function of big data processing [3].

The application of big data technology means is more and more extensive, and the service of big data technology is more diversified in telecommunication enterprises. In order to better apply big data technology means, it is necessary to carry out objective analysis on its content and many other aspects. The data storage formed by analysis also puts forward higher requirements for data warehouse and structure. Because the data warehouse and structure update rate is relatively slow, it can not meet the basic needs of the current information services.

3. LARGE TELECOM DATA PROCESSING IN COMPLEX NETWORKS

3.1 Analysis From the Level of Static Data

Operational data in telecom enterprises are not fixed, but their data structure changes with time. Based on this background, the following points should be considered for large-scale telecom data processing in complex networks.

First, in terms of the distribution of degree and degree, degree refers to the number of other page nodes related to this page node. In the research of telecommunication data, the main purpose is to analyze the information data of users'calls with other users. The outgoing and incoming calls of users are called outgoing and incoming degrees, and the average of all users' nodes is the network average degree. By analyzing the network average in the complex network background, it can be concluded that there is a certain connection with the important level of users. Users with large ratio of outgoing and entry data are the core nodes of the network and also the node contact center [4].

Second, the average path. In the application of large data processing in telecommunications, the average path occupies a very important position. The average path mainly aims at the number of edges of the shortest path between two nodes in the network. When two nodes are randomly selected, the maximum value is the network diameter. The average path length parameter can be used as a measure of the network forwarding ability. In addition, the shortest average path is equal to the fastest value of network transmission. Therefore, the relationship between the average path and the website search is very close.

Thirdly, clustering coefficient. Clustering coefficient is a general term for describing the degree of aggregation of network connections. If the network aggregation is relatively close, the corresponding network nodes will become very close. Simply speaking, when the network nodes have many neighbors, this part of the neighbors may also be neighbors.

3.2 Analysis From the Dynamic Level of Data

It is not difficult to find that the big data of telecommunication has its own special characteristics, which is reflected in the dynamic nature of users and the distinct feature of life cycle. Time evolution is one of the attributes of complex networks, and any network will evolve after its application, but this is true. Some data are difficult to be studied and analyzed in minutes or seconds. Therefore, in order to find out the hidden core value, generally speaking, the research and analysis of call data are carried out in quarterly or monthly units. In the research of call data, we can get two valuable information, one is call aggregation response, the other is to understand the characteristics of user calls. Through the analysis of call aggregation reaction, we can see that the probability of a few data in a large amount of data is higher than other users, and the more relevant users there are, the more difficult it is for these users to break away from the network. Therefore, telecom enterprises take this basic data as the basis of building loss model and use effective methods to retain it. Live in this part of the user. Understanding the characteristics of user calls, using the analysis of user calls data, we can see that a small number of users'calls are mainly concentrated in the evening, but also some users' calls are concentrated in the morning. After the analysis of their data, we can draw this conclusion. Telecom enterprises can use this as a reference basis to establish a new user model for them. Type I, combined with the user's call habits to develop relevant call packages, use to meet the user's call needs, and then outflow good users, attract new users, stimulate their consumption [5].

3.3 Analysis From the Aspect of Community Excavation

Complex network society divides vertices into groups. There is a close relationship between vertices and vertices in each group, and the vertices between groups and groups are far from each other. Therefore, this part of content needs to be fully considered in large data processing of telecommunications. The size of communities in big data is unknown, and the relationship between users and users will change with time. However, the change of community structure in network is very significant. In this case, large data processing can be carried out for community mining.

4. CONCLUDING REMARKS:

In summary, with the application of big data technology becoming more and more popular today, big data also puts forward new requirements and standards for Telecom operators. Therefore, in order to give full play to the effect of big data base

processing, telecom operators should make in-depth processing of big data base and effectively solve the drawbacks and defects of big data. In order to cope with the complex network, we should lay a good start for the long-term development of telecom operators, promote the rapid development of telecom operators, and improve the user experience and service level.[6]

REFERENCES

[1] Sun Shu. Research on Large Telecom Data Processing Based on Complex Network. Economic Management: Full Text Edition, 2016.

[2] Qu Rongbo. Research on Telecom Large Data Processing Based on Complex Network. Information Recording Materials, 2016, 17 (6):19-21.

[3] Shao Fengjing, Sun Rencheng, Sui Yi. Large data analysis based on complex networks. Computer simulation, 2018, V.35 (05):7-14.

[4] Yang Xueguang. Research in the field of scientific research based on complex networks. University of Electronic Science and Technology, 2018.

[5] Xue Gang. Organization Analysis Based on Complex Network Analysis. University of Electronic Science and Technology, 2016.

[6] Hao Zelong. Research on cascading failure model of power grid based on complex network theory. Xiamen Institute of Technology, 2015.

Research on the Construction of Artificial Intelligence in Laboratory Safety Management in Colleges and Universities

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Abstract: The progress and development of science and technology have given birth to artificial intelligence, which has gradually entered people's lives, making our work and life more convenient and efficient. The application of artificial intelligence in the laboratories of colleges and universities makes the laboratories more intelligent and humane, and improves the management level of the laboratories at the same time. From the point of view of artificial intelligence, this paper discusses how artificial intelligence can be better applied to the safety management construction of school laboratories, strives to improve the efficiency of laboratory safety management, evades the possible management risks in the traditional safety management of school laboratories, prevents laboratory safety accidents, makes artificial intelligence bring convenience to the management of University laboratories, and makes laboratory construction easier. To become a safe and modern experimental site.
Keywords: artificial intelligence; University laboratory; safety management construction

College laboratory is an important part of school education, and also an essential basic condition to ensure students to practice in class and after class. For the management of school laboratories, we must do a good job in laboratory safety management to prevent school safety accidents. Therefore, the application of artificial intelligence technology to the safety management of university laboratories and the efforts to integrate artificial intelligence into the safety management of university laboratories will greatly improve the safety management of school teachers and staff, while minimizing the possible risks. Artificial intelligence improves the objective environment of the laboratory, makes students feel more comfortable when using the laboratory, while maintaining a certain degree of security. Integrating artificial intelligence into the safety management of laboratories in colleges and universities has important practical significance. Practice also shows that artificial intelligence technology not only protects the personal and property safety of students and teachers, but also greatly improves the utilization rate of laboratories. Therefore, we must attach importance to the application of artificial intelligence technology in university laboratory management system, and strive to find better safety management measures, so as to make university laboratories improve their own value, so that the existence of laboratories can bring progress to students' studies.[1]

1. ARTIFICIAL INTELLIGENCE

We can understand AI technology in such a simple way: computer relies on huge data and internet, and writes instructions similar to human behavior through algorithmic simulation of human activities, so that computer can operate things by analogizing human thinking mode. Artificial intelligence technology has been put forward in China in the early years, but the real rapid development is the promotion of science and technology and the Internet in recent years. Artificial intelligence technology includes not only computers, but also professional knowledge of psychology, philosophy and ethics. Therefore, the reason why artificial intelligence can enter our life is that it involves a wide range of fields. In the 21st century, artificial intelligence, energy technology and genetic engineering are called three top technologies. Nowadays, we can see artificial intelligence in various industries, such as electric automation control, autopilot technology, automatic robot sweeping, robot rescue and disaster relief, etc. The application of artificial intelligence in the construction of laboratory safety management in Colleges and universities makes up for the shortcomings of traditional management and upgrades the backward laboratory safety management mode. Laboratories in Colleges and universities will reconstruct the safety management system of laboratories with artificial intelligence technology. With the help of artificial intelligence technology, the intelligent safety supervision of laboratories will be realized, the safety management level of laboratories will be greatly improved, the property safety of laboratories and students will be guaranteed, and managers will be helped to better manage laboratories and escort students' personal safety.

2. PROBLEMS EXISTING IN THE SAFETY MANAGEMENT OF LABORATORIES IN COLLEGES AND UNIVERSITIES IN THE PAST

2.1 Backward Management and Complicated Management

In the past, university laboratories used manual

management method, which not only wasted a lot of manpower and material resources, but also had many management loopholes, and laboratory safety problems were frequent. In some universities, the laboratories are not even managed by special managers, only used by students themselves. The caretakers of teaching buildings only conduct corridor inspections every evening to see if the laboratories turn off the power supply. Every day, the lab staff are free to enter and leave the laboratory. The registration of lab staff in most universities is cumbersome. Manual management wastes resources, and it is not easy to find the list of lab staff. Once an accident occurs in the laboratory, it will become extremely difficult to trace the lab staff. In the past, the way of laboratory manual management in colleges and universities has not been able to adapt to the development of the times, nor can it meet the needs of college students and teachers for laboratories. Lack of management will affect the frequency of laboratory use. Manual management laboratory not only increases the difficulty of management, but also greatly wastes the existing resources, and brings more potential safety hazards to the laboratory.[2]

2.2 Lab Safety is Not Guaranteed and Supervision is Not in Place

In the past, some colleges and universities installed management systems for school laboratories, but because of the long time, most of the management parts have failed, and the degree of intellectualization in the past obviously can not meet the current security management needs. Therefore, the laboratory safety management system in most colleges and universities is basically set up, and the laboratory safety supervision is still carried out manually. However, such a security risk is extremely great, not only can not timely remedy the safety incidents, but also can not timely detect security management loopholes. Most laboratory managers are responsible for several laboratories, or even responsible for different floors of laboratories. At the same time, managers lack safety awareness and sense of responsibility. Such a result will lead to a failure to supervise the laboratories throughout the day. Two, some safety hazards in laboratories are hard to detect. The management only checks whether the power supply of the laboratory and some of the experimental equipment are damaged every day. However, it is not known whether the safety problems such as the aging of the circuit and the safety hazards of some experimental equipment are unknown. Therefore, once a laboratory safety accident occurs, it may cause serious consequences, which will lead to irreparable losses. If the traditional safety supervision is not in place, we must introduce the laboratory safety management system of artificial intelligence, so as to realize the omni-directional automatic supervision of laboratories, to make up for the lack of manual supervision.

3. THE CONSTRUCTION OF ARTIFICIAL INTELLIGENCE IN LABORATORY SAFETY MANAGEMENT IN COLLEGES AND UNIVERSITIES

3.1 Applying Artificial Intelligence to Laboratory Intelligent Management, Greatly Improving Management Efficiency

Now we can find more and more AI figures in our life, such as intelligent navigation, face recognition technology, automatic control system and so on. The application of artificial intelligence in University experiments will greatly improve the management level of laboratories, improve the management system scientifically and rationally, so as to improve the management efficiency and ensure the safety of laboratories. For example, facial recognition system is installed on the door of the laboratory, so as to realize the automatic registration management of University personnel. Facial recognition system has become a magic weapon of personnel management in University laboratories. Automatic recognition system not only records every student and teacher entering and leaving the laboratory quickly and accurately, but also speeds up and simplifies the management process, saves resources and ensures the safety of personnel entering and leaving the laboratory. There are also some artificial intelligence technologies, such as unattended automatic lights off, intelligent detection environment, security alarm system, etc., which improve the efficiency of laboratory administrators and reduce the workload. In the future, the unattended intelligent management of laboratories will become a major trend.

3.2 Realizing the Safety Management of University Laboratories by Artificial Intelligence

Artificial intelligence can not only realize the daily management of laboratories, but also carry out intelligent safety management of University laboratories. Laboratory equipment is often more and more valuable, and many equipment have requirements for the experimental environment, such as too high or too low laboratory environment will cause damage to the experimental equipment. The application of artificial intelligence in safety supervision makes up for the influence of laboratory temperature on equipment in the past. Intelligent temperature control system effectively regulates the temperature and humidity in the laboratory, ensures the operation of the equipment at a reasonable temperature, thus prolonging the service life of the equipment. At the same time, the laboratory safety alarm system can realize the circuit control and automatic fire warning of the laboratory. When the indoor smoke is too high and the temperature is too high, it will automatically warn. When the laboratory is not used for a long time, it will automatically power off. If there are problems in the laboratory circuit, it will also automatically warn. The artificial intelligence safety supervision system will run all day, ensure the safety of laboratories all the time, protect the safety of school property and the safety of

teachers and students. In the future, artificial intelligence system will be widely applied to university laboratories, so as to realize the intelligent safety supervision of laboratories.[3]

4. CONCLUSION

Artificial intelligence for school laboratory safety management construction, mainly from the strengthening of laboratory daily management and safety management two aspects, through the electronic equipment and intelligent system, so as to achieve the laboratory's full and full range of guardianship. But the safety management of artificial intelligence does not mean that we can abandon manual supervision. Universities still need to strengthen the work of civil air defense in laboratories. Through timely maintenance of laboratory equipment, strengthening professional training of laboratory managers, and actively publicizing the safety regulations of laboratories, we can improve the safety management supervision of laboratories to the greatest extent and give full play to the laboratories. The value of existence.

REFERENCES

[1] Yang Nian, Chen Cong. A Brief Talk on the Research of the Construction of Artificial Intelligence Laboratory in Colleges and Universities. Electronic Production, 2019 (18): 67-68.

[2] Ma Xian min, San Sheng. Application of artificial intelligence technology in university laboratory management system. China new communications, 2019, 21(06): 107.

[3] Di Yinru. A Brief Analysis of the Application of Artificial Intelligence Technology in Laboratory Management. Chemical Industry Management, 2018 (13): 69-70.

Design of Aviation Audio Monitoring System Based on Embedded Technology

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Abstract: With the popularity of digital electronic technology, digital circuits are used in more and more fields. It has a good application prospect in the field of civil aviation. This paper proposes a digital audio signal monitoring and control system based on embedded technology for the automatic monitoring of aircraft broadcast digital sound source. The paper introduces the derives the work to be done in this paper. Secondly, it introduces the related basic theories such as embedded system, audio knowledge, socket protocol, and selects the socket protocol. Then, the software design of the system is given, including network communication protocol, server and client software design. Finally, socket communication is used to test and debug between Raspberry Pi and Windows. The test project is to test whether the broadcast system is running normally. The second test item is to test whether the monitoring system is running normally. The system has been tested and has good performance and meets the requirements.
Keywords: Embedded technology; Raspberry pie; Socket communication; Audio signal

1. INTRODUCTION

In recent years, the rapid development of Internet technology has enabled technology personnel to communicate through Socket to enable aircraft to broadcast audio.[1] The broadcast equipment is monitored in real time by the monitoring system during broadcasting.[2] Based on the results of the tests, the possible problems were analyzed, and a solution was developed in advance to ensure the safety of the aircraft broadcasting system.

2. SOCKET INTRODUCTION AND SELECTION

Socket is the basis of the communication. It constitutes the basic control unit for network communications that support the TCP/IP protocol. It is an abstract representation of endpoints in network communication and contains five types of information needed for network communication: protocol for connection, local host IP address, local process protocol port, remote host IP address and remote process protocol port.

When the application layer transmits data through the transport layer, TCP faces the problem of providing simultaneous services to multiple application processes at the same time.Multiple TCP connections or multiple application processes may require data transmission through the same TCP port. In order to distinguish between different application processes and connections, many operating systems provide a socket interface that allows applications to interact with the TCP/IP protocol.

2.1 The Design of Audio Monitoring System

The aerial audio monitoring system consists of two parts: the server and the client. The server sends audio streams. The client receives, caches, and plays. The monitoring system monitors.

The server can send multiple audio streams at the same time (in this case, a channel). Each stream corresponds to a session module, and each session module handles the corresponding audio stream. Different streams send programs to different multicast addresses. The correspondence between multicast addresses and streams is handled by the channel management module: all programs played by the server are stored in the file system. The stream client obtains the channel information being played on the stream server through the channel preview module, and selects the channel of interest through the channel selection module. The essence is to select a multicast address and add itself to the multicast group. The system only handles recorded files and transmits audio through Socket UDP communications. After the client receives the audio stream, it first slows down the playback audio. During the client receiving process, the monitoring module monitors the parameters. The main detection parameters are sometimes delayed, lost packets, lost packet rates, etc. As shown in Fig. 1, the system framework diagram is shown.

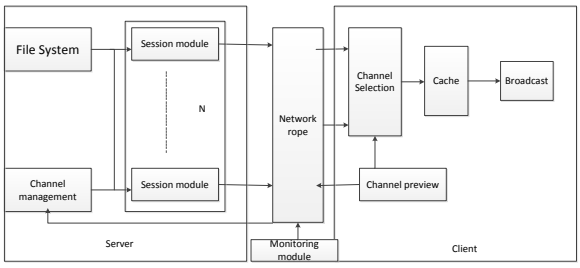

Figure 1 System Structure

3. SOFTWARE DESIGN FOR AUDIO MONITORING SYSTEM

This section defines the protocol specification for the network communication of aircraft broadcasting systems. It is based on the TCP/IP or UDP/IP transmission protocol. This section specifies the transmission rules, data codes, and data formats.

3.1 Protocol Format

The overall frame format is shown in Tab. 1, specifying the frame structure, code, and length.

Table 1. Overall frame format

Sequence number	Frame structure	Code	Length	Instructions
1	frame start	68H	1	frame head
2	protocol version	V	1	
3	length field	L	2	
4	type of device	T	1	
5	control field	C	1	
6	data identification	DT	2	
7	data unit	D	XX	
8	frame check	FCS	1	link user data(application layer)
9	frame end	16H	1	frame end

3.2 Implementation of the Server

The server performs the following functions:

(1) Implement frame-by-frame reading and RTP packaging of audio files.

(2) Implement multistream sending of RTP packages.

(3) Provide mechanism to realize the correspondence and management of multicast address and channel.

(4) Set the server to monitor and process client channel preview requests.

The server structure is shown in Fig. 2:

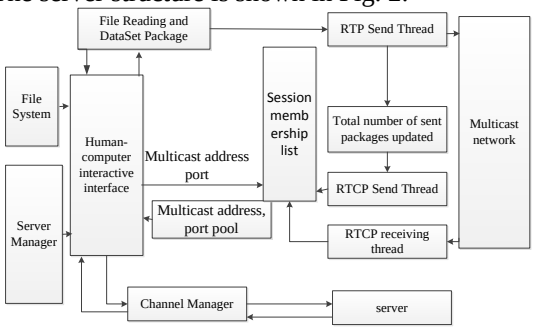

Figure 2 Service-side structure

3.3 Implemention of the Player

The player should have the following features:

(1) The client receives audio streams sent through the network.

(2) Disorder is performed after receiving an RTP packet, and the RTP packet is continuous through the serial number in the packet.

(3) Support the decoding of audio data streams.

(4) Supports preview of program channel information and channel selection.

(5) Monitoring time delay and packet loss.

The client structure diagram is shown in Fig. 3:

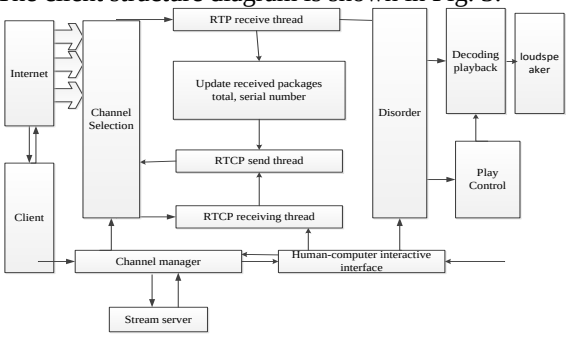

Figure 3 Client Frame

4. TEST DESIGN

For the audio monitoring test part, the monitoring delay and the number of lost packets can be calculated based on the number of lost packets and the total number of packets. The following Tab. 2. shows the audio monitoring test summary.

Table 2. Audio Monitoring Test Summary

Number of tests	Test parameters		
	delay(us）	number of packets lost	bag loss rate
1	92	6	0.96%
2	87	5	0.80%
3	91	8	1.28%
4	90	7	1.12%
5	89	6	0.96%

5. CONCLUSIONS

After testing, the audio broadcast test of the system was successful, and the server was able to normally select audio files and send audio streams. The client can also receive audio and play automatically. The audio monitoring system is monitored normally.

6. ACKNOWLEDGMENT

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REFERENCES

[1]Indivarie Ubhayaratne, Michael P. Pereira, Yong Xiang, Bernard F. Rolfe. Audio signal analysis for tool wear monitoring in sheet metal stamping. Mechanical Systems and Signal Processing, 2017, 85.

[2]Paul Wood, David Sinton. Portable audio electronics for impedance-based measurements in microfluidics. Journal of Micromechanics and Microengineering, 2010, 20(8).

Application of Meta-cognitive Strategies to English Reading—A research into a senior high school in Huanggang City

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Abstract: Meta-cognitive strategy, one of the most important learning strategies, plays a vital role in students' learning process. This article reports a survey on the use of meta-cognitive strategies in English reading among Grade One students in a senior high school in Huanggang city. The research result shows that students don't use or only use a few meta-cognitive strategies during the reading process. It hopes to shed some light on guiding the students to use meta-cognitive strategies to improve their reading efficiency.
Keywords: Meta-cognitive strategies; English reading; Senior high school students.

1. INTRODUCTION

Since the twentieth century, the study of meta-cognitive strategies has gradually become a hot topic in applied linguistics. Holec (1981) argued that school education should set up two teaching goals, one is to help students gain language and communication skills, the other goal is to help students learn how to learn [1]. Meta-cognitive strategy is just that kind of method. It is widely regarded as an important strategy in learning by scholars. Oxford (1990) stated that meta-cognitive strategies refer to the behaviors undertaken by learners to plan, arrange, and assess their own learning [2]. Research shows there is a close relationship between learning strategies and second language learning, and the choice of learning strategies directly affects the level that language learners ultimately achieve. Whether the learner's learning is successful or not depends on how well they apply meta-cognitive strategies to their learning. Developing effective learning strategies for students and promoting their abilities to regulate the learning process has become the top aim of English learning.

This study will conduct a survey on the use of meta-cognitive strategies in English reading among Grade One students in a senior high school in Huanggang city. The research aims to investigate the current situation of students' meta-cognitive strategy use in a senior high school in Huanggang and put forward some relevant suggestions. Research result shows that the students are poor in meta-cognitive knowledge and strategies. In accordance with the findings in the survey, we put forward some relevant suggestions to improve student's meta-cognitive strategies.

2. LITERATURE REVIEW

Meta-cognition is defined as "cognition about cognition". It mainly refers to people's awareness and control of their cognitive processes, emotions and motivations. The previous studies show that meta-cognition is of great significance to students' learning. According to second language acquisition, mastering and applying learning strategies is the key factor to English learning. Among learning strategies, meta-cognitive strategy is the most important one.

What are meta-cognitive strategies?

Flavell (1979) first defined meta-cognitive strategies as "one's own cognitive processes and outcomes or anything related to them [3].

Brown(1980) gave some examples of meta-cognitive strategies in English reading: 1) Clarifying the purposes of reading; 2) Identifying the important aspects of a message; 3) Monitoring ongoing activities to determine whether comprehension was occurring; 4) Engaging in self-questioning to determine whether goals were being achieved; 5) Taking corrective action when failures in comprehension were detected. Later, Brown defined meta-cognitive strategies as the performing skills of planning, monitoring and evaluating learning activities [4].

O'Malley and Chamot (2001) put forward that meta-cognitive strategies are to regulate language learning behavior by means of setting learning goals, monitoring learning process and evaluating learning results [5].

Qiufang Wen (2008) has made a profound study about students' English learning strategies, and defined meta-cognitive strategies as the ways students regulate their own study [6].

English course standards (2003) put learning strategies into the content of standards for the first time. It clearly states High school students should form an English learning strategy that suits their learning needs and can constantly adjust them [7].

3. RESEARCH DESIGN

3.1 Participants

Data for this study were collected in class 11 and 16

in Grade one, a senior high school in Huanggang. There were 118 students in the two classes participated in this study. The participants were among 14-16 years old. They all finished this paper in 15 minutes. So, the author got 118 validated from 118 questionnaires with answering rate 100%. They consented to the use of their response for research purposes and completed the questionnaire anonymously.

As they are randomly selected from the two classes in Grade 1, their questionnaires are very representative. They are taking the senior English course at the same time and still at the first year of senior high school, so it is more credible to evaluate their application of meta-cognitive strategies.

3.2 Research instruments

First of all, the author designed a questionnaire (Table 1) combining O'Malley's classification of meta-cognitive strategies with Suili Zheng's questionnaire [8]. The questionnaire includes twenty-five questions and is made up of three parts: 1-9 are planning strategies, 10-17 are monitoring strategies, 18-25 are evaluating strategies. Then the metacognitive strategies questionnaire will be applied to investigate the 118 participants' use of meta-cognitive strategies during their English reading process.

Table 1. The use of Meta-cognitive strategies

A research paper of students' metacognitive strategies use in senior high school						
Hello, in order to know better about the current situation of students' metacognitive strategies' use, we organize this investigation. The result will not open to the public. Please deal with the questionnaire honestly and seriously. For every situation, you have five choices. (1=very often, 2=often, 3=quite often, 4=rarely, 5=never), please tick the number according to your choice.						
Planning strategies						
1	While reading, I have clear purpose.	1	2	3	4	5
2	I make some reading plans.(For example, I read one book a month at least.)	1	2	3	4	5
3	I often doubt whether the content of the article is consistent with my reading purpose.	1	2	3	4	5
4	Before careful reading, I will go through the passage quickly to get the main idea.	1	2	3	4	5
5	Before reading, I make some predictions about the content of the passage according to the title.	1	2	3	4	5
6	I underline or circle some words or sentences to help me remember what I have read.	1	2	3	4	5
7	While reading, I refer to the notes to help me understand the reading passage.	1	2	3	4	5
8	While reading, I pay attention to clarifying the relationship of the sentences.	1	2	3	4	5
9	While reading, I take notice of the topic sentences to judge the main idea of the reading passage.	1	2	3	4	5
Monitoring strategies						
10	While reading, I ask myself questions and find answers by reading the passage.	1	2	3	4	5
11	While reading, I stop to check whether I understand what I have read.	1	2	3	4	5
12	When the material is difficult, I will consistently encourage myself to understand it and finish it.	1	2	3	4	5
13	When some part is difficult, I will consciously reread this part.	1	2	3	4	5
14	While reading, I check whether proper reading method is used and adjust the improper method.	1	2	3	4	5
15	I adjust my reading speed according to how much time I have and how much I need to read.	1	2	3	4	5
16	I will guess the new words and phrases according to the context and background knowledge.	1	2	3	4	5
17	While reading, I put some main points together to help my understanding.	1	2	3	4	5
Evaluating strategies						
18	After reading, I evaluate how much I learn about the passage.	1	2	3	4	5
19	After reading, I reflect my opinions about the passage rather than fully accept it.	1	2	3	4	5
20	After reading, I summarize the content, opinion and structure of the reading passage in Chinese.	1	2	3	4	5
21	I consciously verify whether my guessing about the reading passage is right.	1	2	3	4	5
22	After reading, I evaluate what I acquire from the passage.	1	2	3	4	5
23	After reading, I summarize whether my performance is good or not.	1	2	3	4	5
24	My evaluating strategies and methods can deepen my understanding about the reading passage.	1	2	3	4	5
25	I tend to find out my weakness after reading and make some improvement.	1	2	3	4	5
Thanks for your help, we really appreciate your participation.						

For each question, the students have five choices: 1=never, 2=rarely, 3=a little often, 4=often, 5=very often.

After that, some of the participants were asked to conduct an interview. The interview is made up of 8 questions. It aims at investigating students' current awareness of using meta-cognitive strategies. 5 students from the two classes were randomly chosen to finish this interview.

4. RESULTS ANALYSIS AND DISCUSSION

As Table 2 shows, the mean score of students' using meta-cognitive strategies is 2.11, which proves that

students rarely use metacognitive strategies during English reading process. Among them, planning strategy is used at a slightly higher frequency with the mean score of 2.35, followed by the monitoring strategy with an average score of 2.04. The evaluating strategy is used least with the average score of 1.91.

Table 2. The overall pattern of students' usage of metacognitive strategies

The overall pattern of students' usage of meta-cognitive strategies		
Planning strategies		mean
1	While reading, I have clear purpose.	3.67
2	I make some reading plans.(For example, I read one book a month at least.)	1.59
3	I often doubt whether the content of the article is consistent with my reading purpose.	1.47
4	Before careful reading, I will go through the passage quickly to get the main idea.	1.92
5	Before reading, I make some predictions about the content of the passage according to the title.	2.87
6	I underline or circle some words or sentences to help me remember what I have read.	3.11
7	While reading, I refer to the notes to help me understand the reading passage.	1.47
8	While reading, I pay attention to clarifying the relationship of the sentences.	2.05
9	While reading, I take notice of the topic sentences to judge the main idea of the reading passage.	3.02
Monitoring strategies		mean
10	While reading, I ask myself questions and find answers by reading the passage.	2.21
11	While reading, I stop to check whether I understand what I have read.	3.15
12	When the material is difficult, I will consistently encourage myself to understand it and finish it.	1.39
13	When some part is difficult, I will consciously reread this part.	1.79
14	While reading, I check whether proper reading method is used and adjust the improper method.	1.47
15	I adjust my reading speed according to how much time I have and how much I need to read.	1.93
16	I will guess the new words and phrases according to the context and background knowledge.	2.1
17	While reading, I put some main points together to help my understanding.	2.29
Evaluating strategies		mean
18	After reading, I evaluate how much I learn about the passage.	2.49
19	After reading, I reflect my opinions about the passage rather than fully accept it.	1.67
20	After reading, I summarize the content, opinion and structure of the reading passage in Chinese.	2.13
21	I consciously verify whether my guessing about the reading passage is right.	2.16
22	After reading, I evaluate what I acquire from the passage.	1.96
23	After reading, I summarize whether my performance is good or not.	1.43
24	My evaluating strategies and methods can deepen my understanding about the reading passage.	1.65
25	I tend to find out my weakness after reading and make some improvement.	1.8

Table 3. The usage of students' planning strategies

Planning strategies		mean
1	While reading, I have clear purpose.	3.67
2	I make some reading plans. (For example, I read one book a month at least.)	1.59
3	I often doubt whether the content of the article is consistent with my reading purpose.	1.47
4	Before careful reading, I will go through the passage quickly to get the main idea.	1.92
5	Before reading, I make some predictions about the content of the passage according to the title.	2.87
6	I underline or circle some words or sentences to help me remember what I have read.	3.11
7	While reading, I refer to the notes to help me understand the reading passage.	1.47
8	While reading, I pay attention to clarifying the relationship of the sentences.	2.05
9	While reading, I take notice of the topic sentences to judge the main idea of the reading passage.	3.02

Table 4. The usage of students' monitoring strategies

Monitoring strategies		mean
10	While reading, I ask myself questions and find answers by reading the passage.	2.21
11	While reading, I stop to check whether I understand what I have read.	3.15
12	When the material is difficult, I will consistently encourage myself to understand it and finish it.	1.39
13	When some part is difficult, I will consciously reread this part.	1.79
14	While reading, I check whether proper reading method is used and adjust the improper method.	1.47
15	I adjust my reading speed according to how much time I have and how much I need to read.	1.93
16	I will guess the new words and phrases according to the context and background knowledge.	2.1
17	While reading, I put some main points together to help my understanding.	2.29

As is reported in Table 3, the mean score of students' using planning strategies is 2.35, which shows that students only use planning strategies sometimes during English reading process. Among planning

strategies, most students have clear purposes, underline or circle words and sentences, take notes now and then. As for the other four planning strategies, students rarely use them for their average score is below 2.

As the Table 4 shows above, the mean score of students' using monitoring strategies is 2.04, which proves that students use planning strategies not too often during English reading process. To understand the reading content, some students tend to ask themselves questions, guess the new words and phrases according to the context and background knowledge. And they often stop to check whether they understand the reading content. According to the Table 3, while reading, students rarely encourage themselves to do better or adjust the reading materials or reading speed.

Table 5. The usage of students' evaluating strategies

Evaluating strategies		mean
18	After reading, I evaluate how much I learn about the passage.	2.49
19	After reading, I reflect my opinions about the passage rather than fully accept it.	1.67
20	After reading, I summarize the content, opinion and structure of the reading passage in Chinese.	2.13
21	I consciously verify whether my guessing about the reading passage is right.	2.16
22	After reading, I evaluate what I acquire from the passage.	1.96
23	After reading, I summarize whether my performance is good or not.	1.43
24	My evaluating strategies and methods can deepen my understanding about the reading passage.	1.65
25	I tend to find out my weakness after reading and make some improvement.	1.8

As is reported in Table 5, the mean score of students' using evaluating strategies is 1.91. The data implies that students rarely use evaluating strategies during English reading. The most frequently used evaluating strategy is evaluating how much they learn about the passage with an average score of 2.49. Students are not willing to reflect or summarize their own opinion, weakness or performance. That is to say, evaluating strategies have been neglected by students while doing English reading.

The interview of students' using of metacognitive strategies in reading

Apart from the questionnaires above, the author has also interviewed 5 students to make the study more rigorous and accurate, and each participant has been asked 8 questions. Aside from some irrelevant answers, their answers to each question can be summarized as follows:

Question 1: Do you know meta-cognitive strategies? Do you often use meta-cognitive strategies in reading?

Students' answer: I have heard of it, but I hardly use it.

Question 2: Do you make a plan before reading? How do you make a reading plan?

Students' answer: Usually I don't make a reading plan, because I am too lazy to do it. Even if I make a plan at the beginning, I can hardly adhere to my plan till the end.

Question 3: Do you have the habit of previewing a reading passage? How do you preview it?

Students' answer: I rarely offer to preview any reading passages. If the teacher asks so, I only read the passage once or twice. I don't think it makes any sense. If the teacher asks us to collect some background information about the reading topic, I will try my best. Because I like the feeling of surfing the Internet to acquire the information I want.

Question 4: What will you do when you encounter a new word or you just can't understand the passage?

Students' answer: Usually I will look up the new words in the dictionary. If there are too many new words, I will give up the reading.

Question 5: While reading, how do you monitor your speed and time?

Students' answer: I think if the passage is easy, I will be faster. If the passage is difficult, I will be slower. I never offer to monitor my reading speed or time.

Question 6: Do you often check if your reading method is proper, and adjust it instantly?

Students' answer: No, I never think of it. I always read word by word, from the beginning word to the last one. I get the meaning of the whole reading passage by getting the meaning of the words. No matter what method is used, I must understand the reading passage.

Question 7: Do you often reflect how to improve your reading skills?

Students' answer: Not really. Usually our reading efficiency depends on the difficulty of reading materials. I think the biggest problem is the new words. Sometimes I made up my mind to remember words, but I just can't stick to it.

Question 8: While doing English reading, do you often summarize what you acquire?

Students' answer: I will not do that except finishing a summarizing task in a test. I think reading is for fun, we shouldn't have purpose.

According to the interview, it is apparent that the students have little knowledge and low awareness of metacognitive awareness. While reading, they rarely use the three kinds of metacognitive strategies.

To sum up, the tables and the interview imply that students rarely use metacognitive strategies during English reading. Among three kinds of strategies, they tend to use planning strategies more often than the other two strategies. They seem to use only a few evaluating strategies. Among planning strategies, most of them have purposes, mark up, and take notice of the topic sentences to help them have better

understanding while reading. Meanwhile, they rarely make reading plans or doubt about whether the materials suit them. Among monitoring strategies, they often stop to check whether they understand what they have read. However, they are not willing to encourage themselves or adjust the improper method. Among evaluating strategies, they like to evaluate how much they learn about the passage. But they hardly tend to summarize their performance. And only a few students use monitoring strategies during reading process. In a word, students have some awareness of planning and monitoring, but they have low awareness of evaluating awareness.

5. CONCLUSION

The new curriculum standard proposes that in English teaching, teachers should consciously help students form suitable learning strategies and adjust their learning strategies constantly. Among the learning strategies, metacognitive strategy is the most important one. Metacognitive strategy is to use the knowledge acquired in the cognitive process to adjust the behavior of English learning by establishing learning objectives and plans, monitoring the learning process and assessing learning outcomes. It can be seen that the metacognitive strategy or reflective learning ability formed by students in high school is very important for future study, and even plays an important role in our lifelong learning. Therefore, proper guidance of metacognitive strategies to students is very important.

However, the survey results show that most students rarely use metacognitive strategies in English reading. Firstly, our students lack knowledge about meta-cognitive strategies. Exam-oriented reading method is the only way used by the students, and they tend to care more about how to take an exam and get high grades instead of what meta-cognitive strategy is. Therefore, our teachers should lead the students to explore meta-cognitive strategy and make sure students have a good understanding of it. Secondly, students lack the awareness of using meta-cognitive strategies while doing English reading. Teachers should pay attention to strengthening students' awareness of using meta-cognitive strategies consciously when teaching reading. What's more, teachers should set an example for the students, showing them how to apply meta-cognitive strategies in English reading. All in all, teachers should guide the students to master meta-cognitive strategies and form self-planning, self-monitoring, self-regulation and self-evaluation skills in English reading. For the students, language learning and English reading should not merely focus on exams and grades. Their reading habits and strategies are also of great importance. If they want to improve their reading efficiency, they should try to become active readers. As Block (1992) stated, active readers do not expect to understand everything as they read. They tend to be ready to question what they acquire from the reading [9].

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REFERENCES

[1]Holec, H. Autonomy and Foreign Language Learning. Oxford, 1981.

[2]Oxford, R. Language Learning Strategies: What Every Teacher Should Know. Boston: Heinle & Heinle, 1990

[3]Flavell, J.H. Metacognition and Cognitive Monitoring: A New Area of Cognitive-developmental Inquiry. American Psychologist, 1979, 34: 906-911.

[4]Brown, N. Meta-cognitive Development and Reading. In R.J. Spiro, B.C, 1980.

[5]O'Malley, J.M & Chamot, A.U. Learning Strategies in Second Language Acquisition. Cambridge University Press, 1989.

[6]Wen, Q.F. & Wang, L.F. A Review of the Factors Affecting the Operation of Foreign Language Learning Strategies System. Foreign Language and Foreign Language Teaching, 2004.

[7]Ministry of Education. English Curriculum Standards for Compulsory Education, Beijing, China; Beijing Normal University Publishing Group, 2003.

[8]Suili Zheng. Research on the Application of Meta-cognitive Strategies to English Reading Teaching in Senior High School. Doctoral dissertation, Northeast Normal university, 2010.

[9]Block, E.L. See How They Read: Comprehension Monitoring of L1 and L2 Reader. TESOL. Quarterly, 1992, 26(2): 319-342.

The Effect Analysis of Taiji Sword Movement Delaying Senility

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Abstract: Gradually aging is a natural law of the human body, however, appropriate exercise can effectively delay the aging process. Practice has proved that reasonable Taiji sword movement can effectively delay senescence. Firstly, the physiological characteristics of middle-aged and elderly people are analyzed in detail. Then, the anti-aging mechanism of Taiji sword movement is analyzed from the two aspects of the Taiji sword movement's function of training brain and qi and the fitness function, and the comprehensive analysis finds that Taiji sword exercise has a very positive effect on the middle-aged and elderly people to delay the aging.
Keywords: Middle-aged and elderly people; Program; Anti-aging

1. INTRODUCTION

Currently, China is already in an aging society. According to the relevant forecast results, by the end of the 2020s, the elderly population in China will account for more than 17% of the total population, and the elderly population is expected to reach 248 million [1]. For social stability and harmony, in order for the elderly to enjoy their old age better, a healthy body is necessary to have, and a large number of practices also fully prove that the elderly through appropriate and reasonable exercise, not only can delay aging, but also can play a role in preventing diseases in old age. Due to the physiological characteristics of the elderly, the elderly is more suitable to choose some gentle exercise, such as tai chi, tai chi sword, tai chi soft power ball, diablo shaking and so on. Taiji sword is a part of Taiji culture and has a wide mass basis. Therefore, this paper takes Taiji sword 32 as an example to deeply analyze the effect of sports on the prevention of diseases in the middle and old age and the fight against aging.

Birth and death is the natural law, as the growth of the age, people will inevitably organs function, for example, the brain: as the growing of the age, the brain will start shrinking and degradation of old people, the elderly surface area of the cerebral cortex and cerebral blood flow also will reduce accordingly, lead to the flexibility of the cerebral cortex nerve activity process gradually recession, directly influence the development of the nervous regulation ability, thus a common memory decline, the memory disorder symptoms, such as slow [2]. Heart: with the increasing of the age, the heart of the old people also can appear physiological aging, cardiac physiological aging is the most main performance for myocardial contraction, produce a kind of fibrous, myocardial sclerosis, and endocardial hardening in older people, make its insufficient supply of heart, easy cause diseases such as myocardial forcedly [3]. Kidney: with the continuous growth of age, the kidneys of the elderly will gradually shrink and become smaller and smaller. The final result is the decrease of renal blood flow, leading to the continuous decline of glomerular filtration rate, leading to the gradual decline of renal function, which is harmful to health [4-6]. Aging is inevitable, but we can slow it down with exercise.

2. ANALYSIS OF ANTI-AGING MECHANISM OF TAIJI SWORD MOVEMENT

2.1 The Effect of Taiji Sword Movement on Brain and Qi Training

Type 32 Taiji sword, also known as simplified Taiji sword, is adapted from the traditional Taiji routine, which has the regularity of the number of movements and the direction of movements. Taiji sword requires slow movement, easy and soft, coherent and uniform, and natural coordination.

Taiji sword movement is a natural way to strengthen the body and cure diseases, which includes guiding and breathing, and requires "both inside and outside" Repair, rigid and soft, in motion for static, static royal movement "; it also emphasizes the coordination and unity of regulating heart, breath and shape. Here, "heart" is spiritual idea, which belongs to the category of higher neural activity in physiology and is the function of brain. "Xi" refers to the traditional Chinese medicine theory of qi, martial artists known as "zhong qi", "internal qi", "internal performance". When practicing sword, we should concentrate our thoughts on the path of sword, and keep no miscellaneous thoughts in our mind, so that our brain will enter a quiet state of "idleness and nothingness". Experimental research shows that: the eeg amplitude after sword dancing is greater than that before sword dancing, the lead between occipital and occipital frontal changes significantly, the alpha wave dominates, its power area increases, the main peak rises very obviously, so after sword dancing, the brain enters a high and quiet waking state. Rezl, a renowned neurophysiologist, aptly described the meaning of the alpha rhythm as an engine in neutral. Can be understood as wiped out all interference signals in the brain, this kind of change and the static

qigong are similar, indicating that 32 type program "both inside and outside practice", "moving in the static" is appropriate, after Beijing, feel particularly clear mind, energetic, often keep practicing 32 type program can make people in high spirit, emotional health. The research and affirmation of the spiritual function, especially the developed countries facing the increasingly serious modern "civilization disease", make many medical experts have a special liking for the Taiji sword health care and health method with magic effect, the author firmly believes that Taiji sword movement will be the effective way to improve the health level and prolong life in the 21st century [7-10].

2.2 The Physical Training Function of Taiji Sword Movement

Experiments in recent years have also proved that the simplified Taiji sword movement plays a multi-faceted role in medical care. Can promote the blood circulation, lower myocardial oxygen consumption, reduce heart burden, and improve myocardial blood supply, improve cardiac blood fractions, thus enhance heart function, treatment of coronary atherosclerotic heart disease, myocardial infarction, hypertension and rheumatic heart valve disease and the sex heart disease, increase the lung capacity, enhance the ventilation function of lung ventilation; Rehabilitation treatment for chronic bronchitis, senile emphysema, chronic non-active tuberculosis, etc. Improve the nervous system, especially the function of plant nerve, enhance the coordination and balance ability of human movement, can treat mild and moderate neurasthenia, all kinds of plant nerve dysfunction. Strengthen gastrointestinal peristalsis, increase the secretion of digestive juice and digestive enzymes; to chronic gastritis, gastroenteritis neurosis, gastrostomies, delayed hepatitis, senile constipation, stomach, duodenal ulcer without complications is very effective. Regulate pituitary gland or higher nerve, endocrine center, improve target gland function, promote body metabolism, enhance human immunity, resist disease, delay senility.

In the time of tai chi sword exercise, except for the internal organs, the movement system also got a good exercise. Program to rely on the waist activities, requirements of exercisers do "by belt sword" "spin turn waist ridge", appropriate exercise the waist, can enhance the renal function of activists, and the spinal cord and autonomic nerve plays a positive role in stimulating, at the same time plus exercisers abs and actively cooperate with every muscle, for exercisers each organs in the abdomen of eliminating blood stasis, to the improvement of the exercisers intestinal peristalsis function has a positive effect, for some of the waist and spinal diseases prevention and control of the effect is more prominent [5].

To judge a person's muscle quality, it is necessary to observe the elasticity and firmness of his muscles. Long-term regular Taiji sword exercise can make his muscles firm and strong, and reduce the accumulation of proud flesh and affect his health. Through a series of muscle relaxation and joint extension and flexion exercises, exercisers can not only make exercisers more comfortable in using the vigorous method, but also rely on the rhythmic squeezing generated thereby to promote the speed of venous blood returning to the heart and improve the cardiac function [5].

When tai chi sword exercises, each part of the exerciser's body can be divided into virtual and real parts. Take the leg as an example. If the center of gravity is on the left leg, the left leg is solid and the right leg is empty. If body center of gravity is in right leg, so left leg is empty, leg ministry exercises through such a kind of empty fact, can have the effect that strengthens leg ministry strength. And then for example, by the foot when exercisers heel, foot, and toe when falling on the ground for real, foot gently the ground is empty, this is called the reality of virtual, regularly on the sole ground, the arch of technical movement, an elastic alternating movement can make movement of the foot muscles and ligaments get better exercise, insist for a long time, can not only play the role of jiao is flat, but also can enhance the flexibility of arch, make the pace of exercisers more light spirit, whole person appear on its feet.

3. CONCLUSION

Aging, it is all sorts of physiological, psychological, and pathological factors under the combined action result, as in old people, must first understand that aging is an irresistible natural laws, but in front of the law of nature, we are not completely powerless, we are unable to prevent aging, but it can be anti-aging, through effective movement for health in later life. A large number of practices have fully proved that Taiji sword exercise can play a role in delaying aging, and Taiji sword exercise has a positive effect on the prevention and treatment of various diseases [6]. Therefore, it is of great significance to promote Taiji sword exercise among middle-aged and elderly people.

REFERENCES

[1]Mu Guangzong, Zhang Tuan. Development trend and strategic response of China's aging population. Journal of central China normal university (humanities and social sciences edition), 2011, 50(5): 29-36.

[2]Ma Qing, Li Min, Chen Haiping. Let humanistic care permeate clinical teaching of geriatrics. Journal of clinical and experimental medicine, 2011, 10(1): 69-71.

[3]Yang zaihui, rong li, yangzi-hui, et al. Effect of Chen Taijiquan on heart function in middle-aged and elderly people. Journal of Beijing sports university, 2005, 28(5): 639-641.

[4]Song Wenmin. Tai chi and its anti-aging mechanism. Chinese tissue engineering research,

2004, 8(18): 3654-3655.
[5]Jiang Xiaogang. Effects of 32-type Taiji sword exercise on blood lipid and blood viscosity in middle-aged and elderly people. Beijing sports university, 2007.
[6]Li Yurun, Li Hua. Effects of sports medicine on anti-aging. Chinese cosmetic medicine, 2017(1): 31-36.
[7]Zhang B, Qin K, Liu Z, et al. Construction of china sports capital market system. 2016 National Convention on Sports Science of China, 2017.
[8]Zhang Bing, Qin Kunling. Research on the inheritance value and measures of traditional ethnic sports in schools. China school sports (higher education), 2014(3).
[9]Kong Dequan, Chao Yuechun. Study on the current situation and countermeasures of taijiquan teaching in colleges and universities of hubei province. Sports science and technology, 2013, 34(2): 110-112.
[10]Zhao Mengju, Chao Yuechun. Study on the value and function of tai chi pile skill. Sports science and technology, 2012, 33(4): 63-65.

Innovative Thinking on College English Teaching Reform in the New Era

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Abstract: This paper mainly discusses the development environment in the new era, some problems of English teaching in colleges of our country, and aiming at the problems existing in the current college English teaching process is put forward a series of solutions, college English teaching for college students is an important teaching activities, relationship between the college students' future development prospects, so during the education of students in colleges and universities, we must put up the full attention to student's English teaching, reform and innovation of the school's teaching mode, to improve the school's teaching environment, to strengthen the construction of the teachers of English teaching, promote the rapid ascension of the comprehensive level of English teaching in colleges and universities.
Keywords: Language environment; English teaching; Teaching reform.

1. INTRODUCTION

In China's college English teaching, we should strengthen the education of students' practical English application ability, so as to promote the rapid improvement of the comprehensive strength of Chinese college students, enable them to better conform to the trend of social development, and meet the requirements of the country and society for modern English talents. But for now, a lot of colleges and universities in our country during the English teaching for college students is in accordance with the more traditional model for teaching English to students, in the process of teaching the one-sided focus on the students' theoretical teaching, ignoring students employment ability training, for the purpose of this force-feeding teaching mode has been far behind the development of The Times, the students lack of interest in learning in the process of learning English, lose enthusiasm and initiative of learning English, can't satisfy the needs of the state and society for English professional talent [1-3].

Among the English majors set up in Chinese colleges and universities, many colleges and universities have set up the major of foreign English trade to cultivate English professionals suitable for China's foreign trade. However, in the actual English teaching process, many English teachers are greatly influenced by the traditional teaching ideas, and they mainly focus on the theoretical teaching in the teaching process, without paying attention to the practical teaching and application-oriented teaching of students. Many students in learning English, just a simple knowledge of English theory to master, but they are not able to apply these theoretical knowledges to practical communication. Many colleges and universities teaching materials for students are also very backward, which cannot meet the requirements of the new era for college English education, and has caused great obstacles to the improvement of students' English learning efficiency [4-8].

In the past practical teaching process, the traditional exam-oriented education has been proved not in line with the development trend of modern society, which will greatly limit the improvement of students' ability. But many colleges and universities in teaching English to students, still can't get away from the bondage of exam-oriented education in English teaching, in teaching English to students, asked the students to rote learning of English knowledge, one-sided to improve students' English achievements, cultivated in this learning mode of college students, English is generally higher, but in practical applications, their English will be performance is very poor, which can lead to lose confidence in their ability for college students, also can hit their enthusiasm to learn English, very bad for students' English level of ascension.

2. INNOVATIVE THINKING ON COLLEGE ENGLISH TEACHING REFORM

2.1 Improve the Macro Teaching Mode of College English

Under the background of the new era, college English teaching in China must break the shackles of the traditional teaching mode and actively seek for a new English teaching mode adapting to the trend of social development. When carrying out the reform and innovation of college English teaching, colleges and universities should, under the guidance of college English classroom teaching requirements, formulate a scientific college English teaching model based on the specific conditions of each college and major, and make an accurate positioning of the college English teaching model. When carrying out English teaching to college students in China, the most important purpose is to cultivate professional English talents with practical English application ability. Therefore, reasonable adjustment should be made to college English teaching mode according to this purpose.

In the innovation of college English teaching mode, the first thing to pay attention to the development of practical courses for English teaching, strengthen the cultivation of student's English practical ability, teachers can use modern multimedia teaching mode, create a good English learning environment for students and learning environment, stimulate students' interest in learning English, improve college students' English learning enthusiasm and initiative, improve students' practical application for English ability and the ability to use English for communication. On college English teaching, in order to let students to experience more real English context, you can also add some European and American culture for students, customs and other aspects of teaching content, to correct the students in learning English grammar, pronunciation is not standard phenomenon, improve college students' ability to use English for communication, let college students to better adapt to use in communicating practice demand. On college English teaching, the English in listening, speaking, reading, writing and translating skills split apart, for all the English skills to targeted teaching of students, for students to set up some characteristic of oral and listening class, reading class, writing and translation class, each student to targeted to practice and improve English skills, in the teaching environment, students can also according to their own lack of targeted learning and improving, to prevent the occurrence of short board themselves in English study, affect their comprehensive English level. At last, the English teacher guides the students to use their skills together to improve their comprehensive English level. When teaching English to college students, colleges and universities should also set some extracurricular English courses for students to extend their classroom learning, broaden their English horizons and promote their comprehensive English level.

2.2 Strengthen the Construction of English Teaching Faculty In Colleges And Universities

On college English teaching, the teacher is in the dominant position in the process of teaching, English teachers are masters of English teaching for college students, also direct participants and executor of college English teaching reform, the quality of college English teachers in the school has a close relationship with English teaching reform's success or failure, so in the English teaching reform in colleges and universities, colleges and universities must strengthen the construction of teachers team, first grab from to enhance the quality of college English teachers, promote the rapid ascension of the level of college English teaching. When strengthening the construction of teaching staff, colleges and universities should first let English teachers stick to their professional duties, improve their professional moral quality, and attach importance to the English teaching of college students. English teaching classroom is the main position for teachers to conduct English teaching to students, and it is also the main place for college students to learn, experience and perceive English. College English teachers in teaching English to students, to break through the bondage of traditional English teaching mode during the English teaching for students to become the student to study the common participants and practitioners, pay attention to the learning ability of students to inspire, undertake to the student learning demonstration, make students form good English learning habit, promote the students' English learning ability of rapid ascension. This requires college English teachers to first have relatively solid teaching skills, and constantly improve their teaching ability in the teaching process, to be able to adapt to the basic requirements of modern English education for teachers.

When teaching English to college students, college English teachers should constantly seek for self-breakthrough and innovative development based on existing English teaching level, and constantly innovate in English teaching to meet the needs of The Times for English education. In college English teaching, the students' teaching material is relatively stable, the upgrading of the teaching material is a very big project, a short period of time can't be done, but college English teachers' teaching methods can make corresponding adjustment timely according to the development of The Times, teachers in teaching English to students, can use modern teaching media, teaching materials and teaching ideas to strengthen the students' English teaching. In assessment and evaluation on the English teachers in colleges and universities, should pay attention to scientific research and use of exams for school teachers of English teaching and reasonable assessment, make English teachers assessment result can fully embody their English teaching level and teaching ability, and the English teacher assessment results and their wages, improve the enthusiasm of English teachers to raise their teaching ability and initiative. After the comprehensive evaluation of teachers in university, can be picked out some English teaching in the school, the teacher in the school set up some typical English teaching, some kind of learning model for college English teachers, rely on the example of power to promote the optimization of the college English teaching team, using the theory of advanced English teaching college English teaching team, promote the rapid ascension of the level of college English teaching.

2.3 Build A Good English Language Learning Environment for College Students

Along with our country reform and opening up and the further development of economic globalization, the communication between our country and the international community is more and more frequent, so the college English teaching also should adhere to the "going out" strategy of teaching, for students to

travel abroad, study abroad, or the opportunity to learn more, let the student real to European and American countries, experience the real English language situation, to understand western people's way of thinking, customs, and language characteristics, improve the students' interest in learning English. In addition to adhere to the "going out" way of English teaching, English teaching should also adhere to the teaching strategy of "introducing", the students in English teaching for the students bring in some more good foreign English teacher, also can make full use of the school of foreign teachers resources, open some foreign teachers to students of non-english major elective course, or provide them with some elective courses on the European and American countries culture, etiquette, lets the student in the school will also be able to fully experience the western culture and custom, enhance their experience of the English language, improve students' interest in learning English. Only by insisting on the combination of "going out" and "bringing in" can we create a real English learning environment for students and promote the rapid development of college English teaching.

Colleges and universities should adhere to the combination of tradition and modernity when teaching English to students. When teaching English to college students, they should make good use of the school's "English corner" and other traditional English learning places to strengthen the English training for students. Can also use the modern Internet information technology for students to record some English speech video, good English movies or English drama, etc for the student to study, after the completion of a play for the students, let students to restore, in the video scene can also let the students give full play to your imagination, outside of their own design and production of some English short play, and provide students with enough opportunities, enhance students' confidence in learning English, improve the students' interest in learning English. When teaching English to students, English teachers can also extend the time and space of English teaching to students by using modern teaching mode such as micro class, so as to provide more English learning opportunities for students, improve the English teaching ability of colleges and universities, and promote the rapid development of college English education.

3. CONCLUSION

With the development of the society, the traditional English teaching mode is no longer suitable for the development of the new era needs, exposed a series of problems, college English teaching reform is imperative. When carrying out English teaching reform in colleges and universities, it is necessary to conform to the development trend of the society, combine the advantages of colleges and universities, improve the English teaching environment, strengthen the construction of English teaching faculty, and innovate the English teaching mode of colleges and universities, so as to lay a solid foundation for the rapid improvement of students' English level.

REFERENCES

[1]Sui Xiao-Bing, Cheng Lulu. Research on interactive teaching model of college English writing mooc assisted by composition automatic correction system. Modern education technology, 2019, 29(02): 67-72.

[2]Hou Xianrong, Gao Siwen. Design and implementation of ACT interactive college English writing teaching in the Internet + era CALL environment. Foreign language and translation, 2016, (4): 57-63.

[3]Watercolor Qin. Multi-Modal teaching model based on moocs-- a case study of college English writing teaching. Journal of weinan normal university, 2017, (10): 57-62+80.

[4]Feng hui. The impact of internationalization of higher education on college English education in China -- on cross-cultural education and teaching model of college English teaching. Exploration of higher education, 2019, 190(02): 2.

[5]Liu zhijie. The reform of college English teaching and the teaching of British and American literature -- on paradox poetics from the perspective of contemporary British and American literary criticism. Chinese journal of education, 2019, 309(01): 154.

[6]Dou wenna, wang junle. Research on influencing factors of cross-cultural sensitivity of contemporary college students. Overseas English, 2019, 390(02): 190-193.

[7]Ding yan. Curriculum and teaching reform of English majors under the new national standards -- a case study of Inner Mongolia university of science and technology. Overseas English, 2018, 388(24): 9-10.

[8]Qian wenjuan. An empirical study on the use of information technology in English learning by vocational college students. Journal of suzhou vocational university, 2019, 30(01): 74-78.

Intelligent Converter Steelmaking Prediction Model under the Background of Big Data

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Abstract: The development of science and technology and the Internet has promoted the advent of the era of big data. The mining and processing of big data can not only reduce production costs and increase extra profits for enterprises, but also drive economic and social development and provide convenient conditions for people's study, life and work. Therefore, it is of great significance for iron and steel enterprises to minimize the cost by establishing automatic batching model. Based on the big data of iron and steel, this paper USES Hadoop technology to process the big data of converter steelmaking process, and calculates that the yield rate of C is 80%~100% and that of Mn is 85%~100%. Then elements yield the BP neural network prediction model is established, the Hadoop as big data collection to store data platform, extract the operation data into the model in the process of converter steelmaking complete model training, implementation of elements yield prediction, it is concluded that BP neural network predictive value is over 90%; The production data of 100 times were randomly selected for simulation optimization, and the result predicted by BP neural network was more practical.
Keywords: Converter steelmaking; Big data; BP neural network.

1. INTRODUCTION

The so-called deoxidation alloying refers to the operation of adding different amounts and types of alloy into the steel after the smelting of different steel types, so as to make the alloy elements in the steel reach the standard, and finally make the finished steel conform to the requirements of the regulations on some physical properties. As the production of high value-added steel iron and steel industry to improve, through the historical data of deoxidation alloying link to establish mathematical model, in order to realize the on-line prediction, the amount and type of optimization in alloy, on the premise of guarantee the quality of molten steel, the maximum extent, reduce the production cost of alloy steel, is each big iron and steel enterprises competitiveness and the decisive guarantee for the long-term development interests.

In this paper, by constructing the Hadoop data platform to collect and store data in a real-time dynamic process of converter steelmaking, the steelmaking process by using the Hadoop - Hadoop distributed file system, large data storage virtualization resources, through the establishment of the BP neural network model to forecast the element yield respectively, ultimately provide new way for iron and steel enterprises.

2. BIG DATA COLLECTION AND STORAGE SYSTEM FOR BOF STEELMAKING BASED ON HADOOP PLATFORM

2.1 Hadoop Core Architecture

Hadoop is an open source distributed computing platform that can run on large-scale clusters. The two core components of Hadoop [1] are Map Reduce and HDFS. Based on Hadoop platform, massive distributed parallel programs can be written and run on a cluster with hundreds or thousands of nodes, where each node provides local computing and storage without relying on hardware to achieve high availability. Map Reduce, as one of the core, is responsible for writing distributed parallel programs. Has two main steps: Map and Reduce, then implement the task decomposition and scheduling, the HDFS and N data is managed by a node, is used to store vast amounts of data, through the converter steelmaking process flow of large data storage, real-time effective calculation and processing, and further obtain valuable information and relative laws, give full play to the role of the Hadoop platform.

2.2 Storage System Construction Based on Distributed Name Node

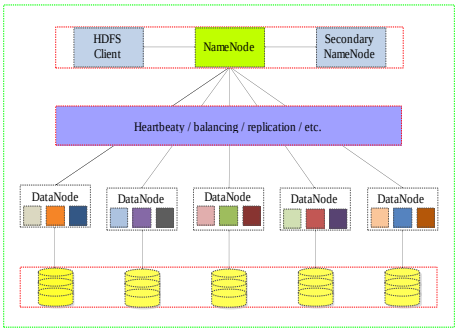

Figure 1. The structure diagram of HDFS system for distributed nodes

The underlying implementation of HDFS is to cut files into many blocks and store these blocks in different Data nodes. The Name Node is the core of

the whole HDFS, which maintains some Data structures and records how many blocks each file is divided into, which Data nodes each block obtains and other important information. Thus, Hadoop is highly available. The details are shown in the following Figure 1.

There are Manager Name Node nodes in the cluster, whose main task is to monitor the working status of Name Node, and the cluster is composed [2] of multiple Name Node nodes, the advantages of the storage system based on multiple Name nodes are as follows:

(1) Enhanced the reliability of the file system. The Name Node and Data Node will send information to the Manager Name Node on a regular basis. If the information returned by the Manager Name Node is not received within the specified time, it will be considered as a failure and the information will be sent to the Secondary Manager Name Node.

(2) Improved the expansion of HDFS file system. Multiple Name Node nodes provide metadata services to the external world at the same time, thus making up for the poor scalability of a single Name Node Node.

2.3 Frame Construction of Big Data Storage Platform for Converter Steelmaking

Due to the timeliness and large reserves of bof production process data, distributed storage system based on Hadoop platform is placed in the virtualized pool of resource management platform. Spark, as a module on Hadoop page, can not only run with the help of Hadoop platform, but also run independently with a solution. It runs three times faster than Map Reduce, greatly reducing the time it takes to process large amounts of data, as shown in Figure 2.

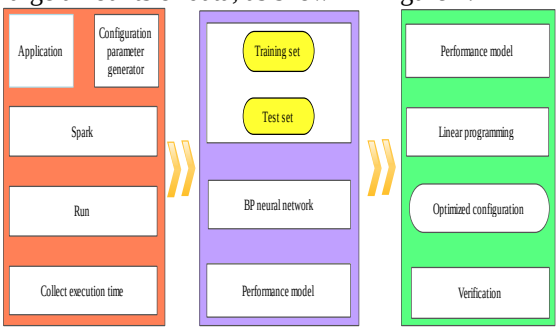

Figure 2. Big Data Platform for Iron and Steel Enterprises Bases on Hadoop

The newly built big data storage platform has a long life cycle and good compatibility. The real-time data in the converter steelmaking process is stored in the platform to realize data processing and application. In the process of data storage, quantifiable data such as the end point of converter, temperature and net weight of molten steel are included to explore the effect of BP neural network on the prediction of element yield rate.

3. ELEMENT YIELD CACULATION

The yield of the alloy is the ratio of the weight of the alloy elements absorbed by the steel during deoxidation alloying to the total weight of the added elements. Due to the complex physical and chemical reactions in the process of converter steelmaking, it is impossible to establish an accurate prediction model of element yield rate. Therefore, it is only based on the previous experience to predict the alloy composition, which will lead to a decrease in the control accuracy and a long processing time, and thereby raise the production cost invisibly.

At present, the prediction methods of alloy yield mainly include reference furnace method and black box modeling method. However, these two methods did not analyze the required modeling input variables from the perspective of smelting, resulting in low accuracy of the results. Therefore, in order to establish a more accurate prediction model, this paper first analyzed the main factors affecting the element yield rate through principal component analysis, and selected C and Mn as the research objects. Finally, BP neural network algorithm was used to establish the element yield rate prediction model. Where, the calculation formula of element yield rate is as follows:

$$y_i = \frac{T_i \times G_i - (G_i + \sum_{j=1}^{17} M_j) \times Q_i}{\sum_{j=1}^{17} M_j \times \omega_i} \quad (1)$$

Where, y_i is the yield rate corresponding to element i, $i = C, Mn$ the net weight of molten steel G_i, the continuous casting positive sample T_i, the mass of A certain alloy M_i, j represents A certain alloy, and the proportion of elements contained in A certain alloy ω_i.

The yield of element is affected by many factors, and the meaning of each variable is analyzed and screened. It can be concluded that after the process of deoxidation alloying, the continuous casting samples have no influence on the yield of elements, so the related variables of the continuous casting samples are not included in the scope of analysis. Correlation analysis was conducted between the seven variables including converter end temperature, converter end C, converter end Mn, converter end S, converter end P, converter end Si and molten steel net weight and the yield rate of alloy C and Mn.

Because different variables [3,4] are of different dimensions and the values vary greatly, it is not appropriate to weighted average them directly and has no practical significance. In order to reflect the actual situation as far as possible and avoid unreasonable phenomenon, the data of each variable was normalized at first.

Applying SPSS to conduct principal component analysis on the initially selected variables, the component matrix of each variable is obtained as follows Table 1:

Table 1. Applying SPSS to conduct principal component analysis

	Composition			
	1	2	3	4
Converter terminal temperature	-0.219	0.298	-0.010	0.837
Converter terminal C	-0.132	0.806	-0.301	-0.109
Converter terminal Mn	-0.696	0.094	0.405	0.158
Steel net weight	0.590	0.109	0.492	0.163
Converter terminal S	0.333	-0.626	-0.315	0.052
Converter terminal P	-0.713	-0.445	0.175	0.240
Converter terminal Si	-0.062	0.077	0.769	-0.351

If the cumulative contribution rate reaches 80%, it can be selected as the main component. As can be seen from the above table, the bof terminal temperature and bof terminal C have the greatest influence on the principal components. This phenomenon directly reflects that these two variables have the greatest influence on the yield rate of C and Mn at the same time. Therefore, it can be concluded that the main factors affecting the yield rate of C and Mn are the temperature at the end of bof and C at the end of bof.

4. PREDICTION MODEL OF C AND Mn YIELD BASED ON BP NEURAL NETWORK

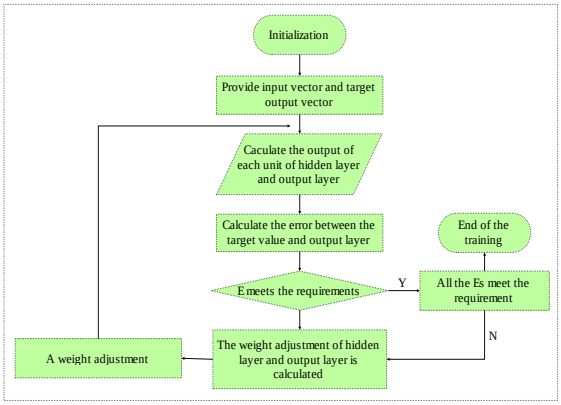

Figure 3. BP neural network algorithm flow chart

As one of the most widely used neural network models, BP neural network is a multi-layer feedforward network based on error back-propagation. Its learning process is divided into two processes: forward propagation and back propagation of signals.

Suppose A training sample, input vector $x_n=(x_1,x_2,\cdots,x_n)^T$, output vector $y_m=(y_1,y_2,\cdots,y_m)^T$ of the hidden layer, output vector $o_k=(o_1,o_2,\cdots,o_k,\cdots,o_1)^T$ of the output layer and expected output vector $d_k=(d_1,d_2,\cdots,d_k,\cdots,d_1)^T$, use ω to represent the weight between the input layer and the hidden layer, then the weight matrix can be expressed as $\omega=(\omega_1,\omega_2,\cdots,\omega_j,\cdots,\omega_1)$, and the weight matrix between the hidden layer and the output layer is $v=(v_1,v_2,\cdots,v_k,v_1)$. BP neural network flowchart, as shown in Figure 3.

4.1 Model Solving

According to the data set of C and Mn receiving rate, divide the data set into 90% training sets, and build a three-layer network layer. The input vector is $X=(x_1,x_2\ldots,x_n)^T$, the output vector of the hidden layer is $Y=(y_1,y_2\ldots,y_m)^T$, and the output vector of the output layer is $G=(g_1,g_2\ldots,g_k)^T$.

Layer 1 network layer, weight matrix dimension (3, 5), coefficient matrix:

$$\begin{bmatrix} -1.44e-01 & -6.77e+03 & -8.66e-01 & -3.42e-01 & -6.12e-01 \\ -7.06e-01 & -5.46e-01 & -2.68e-01 & -1.79e-01 & 6.72e-02 \\ -1.40e-01 & 3.17e-01 & -5.12e-01 & 6.55e-01 & -8.19e-01 \end{bmatrix}$$

Layer 2 network layer, weight matrix dimension (5, 3), coefficient matrix:

$$\begin{bmatrix} 5.209e-01 & 8.111e-01 & -3.232e-01 \\ 3.695e+03 & -1.918e-01 & -3.749e-01 \\ -7.187e-01 & -7.984e-01 & -5.719e-01 \\ 6.550e-01 & -6.957e-01 & -1.366e-01 \\ 7.931e-01 & 5.744e-01 & 3.323e-01 \end{bmatrix}$$

Layer 3 network layer, weight matrix dimension (3, 1), coefficient matrix:

$$\begin{bmatrix} 1041.223 \\ 2042.366 \\ 2141.848 \end{bmatrix}.$$

The actual and predicted values of Mn、C yield in any 100 cycles are as follows, as shown in Figure 4 and Figure 5.

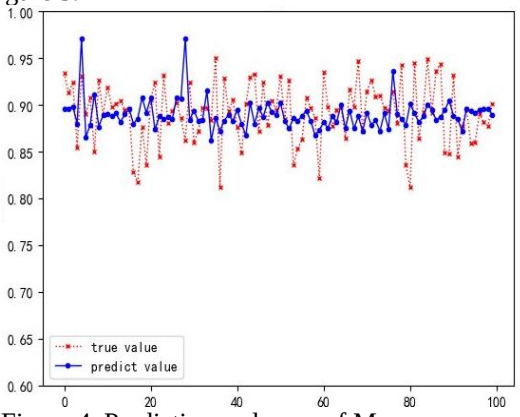

Figure 4. Prediction and error of Mn

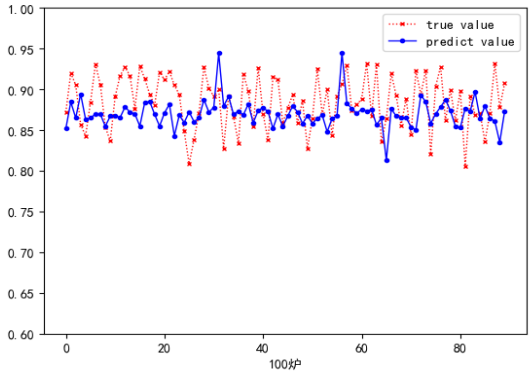

Figure 5. Prediction and error of C

The predicted value of Mn in the end point of 100 furnaces reached over 85%, and some predicted values exceeded 95% or even approached 100%. At the same time, 100 groups of error values of Mn can be obtained, and some error values tend to zero. The error values above 95% do not exceed the interval [-0.1,0.1], but some error points are smaller than -0.1. Therefore, the predicted values can be further optimized through simulation prediction.

Most of the predicted values of the terminal component C of 100 furnaces are over 85%, and a few are over 95%. In addition, 100 groups of error values of C can be obtained. Most error values tend to zero, and all error values do not exceed the interval [-0.1,0.1].

4.2 Simulation Optimization Test

By analyzing the reaction mechanism [4] of the bof steelmaking process, according to a large amount of data collected, the historical yield rates of C and Mn are calculated and the main influence factors of the yield rates of C and Mn are analyzed, including the temperature at the end of the bof and C at the end of the bof. The accuracy and reliability of BP neural network model were tested by 10 groups of HRB400B steel number data.

The target steel output content is the target value of the steel product reaching the target, so the target steel output content i=0.23 and blowing out component i are the end point i of the converter. According to the BP neural network model, the simulation values and optimization error of C and Mn are shown as follows, as shown in Figure 6 and Figure 7.

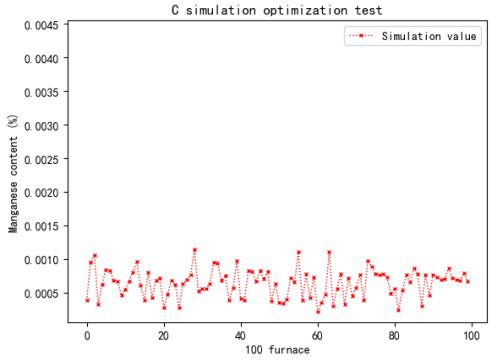

Figure 6. C simulation test chart

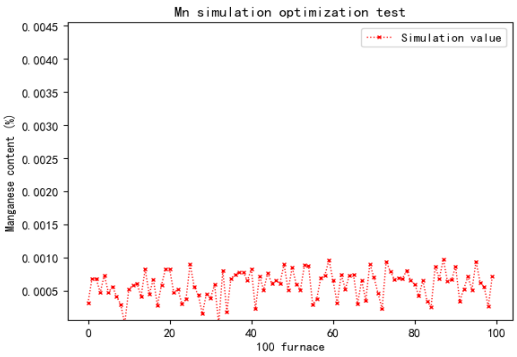

Figure 7. Mn simulation test chart

Conclusion: according to the control interval theorem, the simulation optimization error of BP neural network for carbon and manganese is within [-0.01, 0.01] range, and the prediction accuracy is above 94%. Therefore, the recovery rate predicted by BP neural network is reliable.

5. CONCLUSION

By establishing a mathematical model, the function of online prediction and optimization of the type and quantity of alloy input is realized, and the cost is minimized on the premise of guaranteeing the quality of molten steel. Here, based on Hadoop + Hive data platform, this paper collects and stores data in the converter steelmaking process, and realizes the prediction of element yield rate by combining BP neural network. Through case analysis, the intelligent converter steelmaking energy consumption system built in this paper based on the background of big data has practical application, which determines the best batting scheme for a steel mill in hebei and reduces the cost of steel enterprises. Therefore, this system can provide reference for the sustainable economic development and resource recycling of iron and steel enterprises. At the same time, the streaming big data of steelmaking process can be stored in the platform to realize the full use of data information and promote enterprises to enter the information age quickly.

REFERENCES

[1]Xiong, Liu, H. Feng, and L. Chen. Constructal Design of a Converter Steelmaking Procedure Based on Multi-objective Optimization. Arabian Journal for Science & Engineering, 2018, 43 (6):1-13.

[2]Chong, Zou, et al. Effects of dust collection from converter steelmaking process on combustion characteristics of pulverized coal. Powder Technology, 2018: S0032591018301955.

[3]Tang, Biao, et al. The Research Process on Converter Steelmaking Process by Using Limestone. IOP Conference Series Earth and Environmental Science, 2017, 81 (1):012-175.

[4]Bouafia, Mousaab, D. Benterki, and A. Yassine. A new efficient short-step projective interior point method for linear programming. Operations Research Letters, 2018, 46 (3): S0167637717303942

Color Dimension and Substance Concentration Identification

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Abstract: The relationship between color dimension and substance concentration was studied by applying photography and color resolution to the detection of substance concentration. In order to solve the first problem, the data analysis model of Pearson analysis and multiple linear regression was established, Pearson correlation analysis was carried out, and abnormal data were removed from the residual diagram to obtain a more accurate relational expression. The probability statistics P, fitting degree R2, estimation error variance and probability statistics of F are compared. The data from good to bad is histamine, potassium bromate, aluminum potassium sulfate, industrial alkali and urea in milk. In order to solve the second problem, the scatter plot is used to determine the H to describe the sulfur dioxide concentration, and the Miemann model is improved to obtain the Miemann color reading and substance concentration model. The NLINFIT function is used to calculate the value of the setup parameters and give the error analysis. According to the third problem, several special factors are counted, and the color dimension has a greater impact on the model than the amount of data, but the color dimension is not as much as possible and should be selected according to the actual situation.
Keywords: Pearson correlation analysis; Multiple linear regression; Mieman's improved model; NLINFIT functions.

1. INTRODUCTION

As a method for detecting the concentration of a substance, the colorimetric method detects the degree of the substance by comparing the color developed on the white test paper with the solution prepared from the substance to be tested with a standard color chart. However, each person's sensitivity to color and observational errors can have a large impact on the accuracy of this method. Therefore, it is desirable to establish a more accurate material concentration by establishing a relationship between color reading and material concentration by means of photographic techniques and color resolution enhancement.

1.1 Determine the Relationship between Color

Dimension and material concentration. First, the data is simply processed.

$$\tilde{x} = \sum_{i=1}^{n} x_i \quad (1)$$

Find the average value of each substance at the same concentration, and

The values and concentrations of B, R, G, H, and S at different concentrations of each material were converted into a line graph with data markers.

As can be seen from the figure, when the concentration of the five substances increases, the green color value, the red color value, the blue color value and the hue will decrease, and the saturation will increase. The results of the line graphs of the other four substances are this is the same, indicating that there is a certain relationship between the color reading and the substance concentration.

In order to explain their relationship more scientifically, the correlation between the concentration of five substances and five data values was analyzed by SPSS software [1,2]. A correlation analysis table is shown in Appendix 1. The results of the correlation analysis of the obtained histamine are shown in Table 1.

Table 1 results of correlation analysis

	B	G	R	H	S
Pr	-0.972**	-0.997**	-0.931**	-0.978**	0.963**
X	0.000	0.000	0.000	0.000	0.000

From the results, the histamine concentration has a strong correlation with the five-color data. Therefore, the color readings in the first set of data are related to the substance concentration. Therefore, we use the multiple linear regression [3] for histamine concentration and color data to obtain the relationship, and then perform error analysis to obtain the residual map [4].

After eliminating the two sets of abnormal data, the multiple linear regression [5-7] is used again to obtain the relationship, and the relationship between the histamine concentration and the color dimension is

$$ppm_1 = 3.8958\times10^3 - 19.2363B + 10.2169G - 13.5216R - 36.8568H - 11.0053S \quad (2)$$

According to the same method, the relationship between potassium bromate, potassium aluminum sulfate, industrial alkali and urea in milk is

$$ppm_2 = -4.1418 + 0.0153B + 0.0056G + 0.0025R + 0.0357H + 0.0082S \quad (3)$$

$$ppm_3 = 261.0649 + 0.1642B - 1.3982G - 0.3136R - 0.1306H - 0.8799S \quad (4)$$

$$ppm_4 = 33.3016 + 0.0644B - 0.0748G - 0.1977R - 0.0994H - 0.0783S \quad (5)$$

$$ppm_5 = 1.7748 + 0.0290B + 0.0433G - 0.0803R - 0.0337H + 0.0245S \quad (6)$$

1.2 Analysis of the advantages and disadvantages of data based on comparison

Now analyze the advantages and disadvantages of the five groups of data [8], select the statistic F, the probability P of the F statistic, the fitting degree R2, the estimated error variance, the number of culling data sets, etc., as shown in Table 2.

Table 2 statistical table of data of five substances

S	*F*	*P*	R^2	Y	T
Histamin	29.725	0.032	0.986	72.6125	2
Potassiu	10.249	0.021	0.927	226.2568	0
Industrial	0.3426	0.342	0.631	31.5381	0
Aluminiu	9.3844	0.000	0.618	0.9534	2
In the milk urea	36.4207	0.0000	0.9580	37904.2070	3

Among them, the closer the value of P is to 0, the better, the closer the value of R^2 is to 1, the better, the smaller the variance of the estimated residual is, the smaller the number of data sets is, the better. Therefore, according to the calculation results of various substances, the five groups of data are ranked in good or bad, from the best to the bad are histamine, potassium bromate, potassium aluminum sulfate, industrial alkali, and urea in milk.

2. MATHEMATICAL MODEL BASED ON MIMAN'S COLOR READINGS AND MATERIAL CONCENTRATIONS

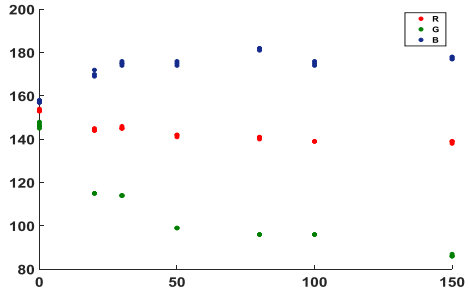

Fig.1 scatter diagram of RGB and SO2 concentration

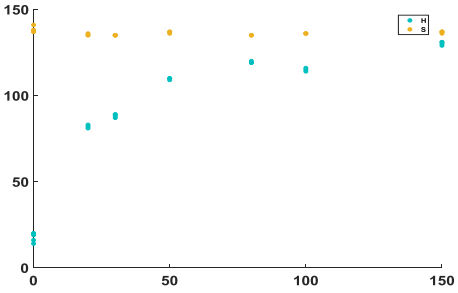

Fig. 2 scatter diagram of HS and SO2 concentration

First, a scatter plot of RGB and HS and sulfur dioxide concentrations is made. As shown in Figure 1 and Figure 2.

According to the scattergram, the relationship between the color dimension H and the concentration of sulfur dioxide is most obvious, and it increases with the increase of the concentration of sulfur dioxide, and tends to a fixed value when the concentration reaches a certain extent to 100%.

Therefore, we choose the color dimension H to describe the concentration of sulfur dioxide and establish a relationship between the two factors.

Establish a model of the improved Miman equation [9].

$$H = \frac{\partial_1 ppm}{\partial_2 + ppm} \quad (7)$$

Among them are two parameters. We use the nlinfit function [10] to make a relationship between the color dimension H and the concentration of sulfur dioxide, as shown in Figure 3.

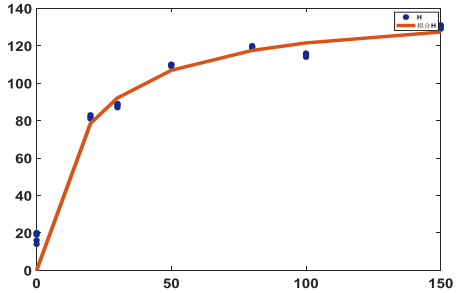

Fig. 3 Fitting diagram of SO2 concentration and color dimension H

And get their value.

$$\partial_1 = 140.8184$$

$$\partial_2 = 15.8583$$

Therefore, the relationship between the color dimension H and the concentration of sulfur dioxide can be obtained

$$H = \frac{140.8184\,ppm}{15.8583 + ppm} \quad (8)$$

We want to establish the relationship between the concentration of sulfur dioxide and the color dimension H. The independent variable should be the color dimension H, and the dependent variable should be the concentration of sulfur dioxide. Therefore, we find the inverse function of the formula

$$ppm_{SO_2} = \frac{15.8583H}{140.8184 \quad H} \quad (9)$$

According to the results, the obtained model error is small. The reasons for the error are as follows:

1) Eliminate data.

2) The resolution of the photo causes the color dimension value to be inaccurate.

3) The environment in which the photos are taken may not be the same.

4) Influence of data volume and color dimension on

model based on analytic hierarchy process.

Regarding the analysis of the influence of data volume and color dimension on the model, we have carried out relevant statistics on the data provided in the annex, and obtained the results as shown in Table 3.

Table 3 Data statistical results

S	N	J	Number of sets of data	Final number of dimensions
Histamine	5	2	10	5
Potassium bromate	5	2	10	5
Industrial base	7	1	7	5
Aluminium potassium sulfat	6	6	37	5
In the milk urea	6	3	15	5
Sulfur dioxide	7	4	31	1

In order to more clearly see the influence of color dimension and data amount on the model, we analyzed it through analytic hierarchy process [11]. Firstly, we selected the target layer, criterion layer and scheme layer factors in analytic hierarchy process [12]. See Figure 4.

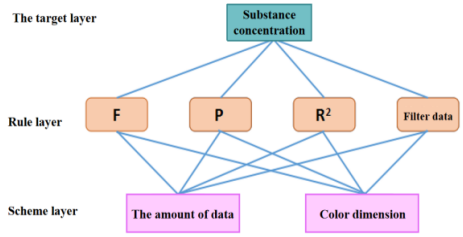

Fig.4 Hierarchy determination of ahp

The judgment matrix of the criterion layer is,

$$A = \begin{bmatrix} 1 & \frac{1}{2} & 4 & 3 \\ 2 & 1 & 3 & 2 \\ \frac{1}{4} & \frac{1}{3} & 1 & \frac{1}{5} \\ \frac{1}{3} & \frac{1}{2} & 5 & 1 \end{bmatrix} \quad (10)$$

Finally, the weight of the color dimension is 0.581 and the weight of the data amount is 0.419. Therefore, the color dimension has a greater impact on the model than the data amount.

3.1 The Impact of Data Volume on the Model

According to the result of the merits and demerits of the data obtained in question 1, we analyze the data volume of each group in turn. The data amount of histamine and potassium bromate is the same and at the medium level. The data of industrial alkali is the least, and the correlation obtained is not obvious. Both the statistical probability of F and the fitting degree value are quite different from the standard value. The data amount of aluminum potassium sulfate is the largest, but the relation formula obtained by it is not the one with the smallest error, because too much data will increase the difference data, resulting in excessive impact on the overall analysis. Therefore, too much or too little data will affect the model to varying degrees, thus reducing the reliability and prediction range of the model. So you should choose the right amount of data.

3.2 The Effect of Color Dimensions on the Model

Although the color dimension has a great influence on the model, more color dimension is not better. The selection of color dimension should be based on its correlation with the concentration of substances.

4. CONCLUSION

Advantages: 1. Error analysis was carried out during the establishment and solution of the model, and the relation obtained was more accurate. 2. It has been tested in the process of model establishment to enhance the reliability of the model.3. It satisfies the connection between material concentration and multiple color dimensions, which is more comprehensive. Disadvantages: The expression chosen by the model is only a speculation, which makes regression analysis limited in some cases. Promotion: This model can not only be used to detect the concentration of substances, but also be used to measure the pH of substances and the content of exclusive substances. Therefore, it can be used to measure the pH of substances and the content of exclusive substances.

REFERENCES

[1]Wang xueyi. Examples of marketing application of SPSS analysis method. Electronic production, 2014, (21): 170.

[2]Wu Ruilin, Wang Jianzhong, Yuan Kehai. Monte carlo simulation of multi-fractal correlation and Pearson correlation. Journal of Beijing university of aeronautics and astronautics, 2009, 35(12): 1507-1510+1515.

[3]Tian bing. Multiple linear regression analysis and its practical application. Yinshan journal (natural science), 2011, 25(01): 16-19.

[4]Du wen. Study on multiple correction and reconstruction of defect data in model transfer and multiple linear methods of alternate residuals. Hunan University, 2016.

[5]Ren Dan. Design and implementation of box office prediction system based on multiple linear regression model. Sun yat-sen University, 2015.

[6]Shi Jingyi. Based on SPSS, analyze the correlation between cet4 certificate and seafarers' navigation English ability. Journal of Zhejiang traffic vocational and technical college, 2013, 14(01): 58-61+66.

[7]Ma Yue. Data processing and error analysis of satellite-borne laser height measurement system. Wuhan University, 2013.

[8]Tan Chong. Safety evaluation and early warning of offshore platforms based on data analysis. China University of geosciences, 2016.

[9]Dai Dongchen. Mathematical model and engineering application of boltzmann equation to

simulate swimming of fish and other aquatic animals. Tsinghua University, 2016.
[10]Dong Qiaoling. Application of global least square method in multiple linear regression under different error impact models. Taiyuan University of technology, 2016.
[11]He Furong. Application research of analytic hierarchy process in construction bidding. Southwest Jiaotong University, 2014.
[12]Huang Hongjin. Research on the application of AHP and fuzzy comprehensive evaluation in public policy evaluation. Central China normal university, 2014.

Analysis of the Status Quo of the Elderly Care in Tangshan City

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Abstract: With the continuous deepening of China's aging problem and the rapid improvement of living standards, the old-age service industry has achieved a certain degree of progress, but the contradiction between pension supply and demand is still outstanding. Based on this meaning, this situation is analyzed. Firstly, taking the supply-demand relationship as the entry point, selecting the appropriate demand indicator supply index, and analyzing the development of the old-age cause by looking up the current data of various indicators of Tangshan City, the current development of the pension business in Tangshan City is obtained.
Keyword: Pension service system; Supply and demand; Elderly Care.

1. INTRODUCTION

Check the relevant literature to select and evaluate several indicators of the development of the aged care industry, collect relevant data of the pension business in Tangshan City according to the indicators, and evaluate the Tang Lao industry based on the data.

2. MODEL HYPOTHESIS

Data sources are reliable and data is rea.

The nursing homes included in the data source website cover all nursing homes in Tangshan City.

The current situation of the needs of the elderly in Tangshan City.

In order to build a more complete pension system, this paper describes the needs and supply of the elderly and the old-age resources separately.

Internal factors

The current situation of the needs of the elderly in Tangshan City.

Tangshan City Statistical Yearbook data shows that the total registered population of Tangshan City at the end of 2018 was 7,512,200, a decrease of 23,100 from the end of the previous year. Among them, the number of elderly people over the age of 60 is 1,468,500, accounting for 21.89% of the total population. The composition of the population of all ages in Tangshan is shown in Figure 1.

As can be seen from the Figure 1, in the age structure of the population, the proportion of the elderly over 60 years old is getting higher and higher. As of the end of 2008, the proportion of population over 60 years old in Tangshan City was 13.83%. In 2018, the population of people over 60 years old in Tangshan City reached 1,468,500, accounting for 22% of the total population, and it is increasing year by year. Matlab was used to fit the changes in the number of elderly people in the past ten years.

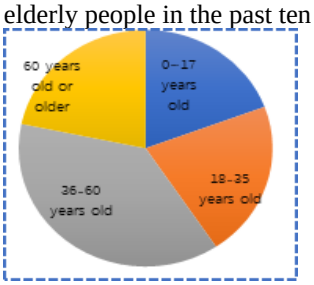

Figure 1 The proportion of population in all age groups in Tangshan City

By referring to the previous survey report [1], the relevant data are obtained in the following 200 questionnaires, as Table 1.

Table 1 Elderly living situation table

category	frequency	percentage	Effective percentage
Single living alone	31	15.5%	15.6%
Only couples live together	112	56%	56.5%
overall	198	99%	100.0%
Defect value	2	1%	
Sample population	200	100.0%	

As can be seen from the above table, in the sample, 15.6% of the elderly live alone, and 56.5% of the couple live alone, totaling 71.5%. This shows that most elderly families are in an empty nest state, the elderly care is more serious, and the degree of empty nesting is high. Therefore, it is particularly important to improve the happiness of the elderly by building community-supported old-age care [2].

2.1 Mental Comfort

In view of the influence of the "4-2-1" family structure and the hollowing out and core of the family, the lifestyle and living conditions of many elderly people in the community deserve attention [3]. Their physical health is often good, and there is still a skill, but long-term empty nests or living alone make their lives relatively simple and closed. This has a major

impact on the physical and mental health of the elderly [4], as Figure 2.

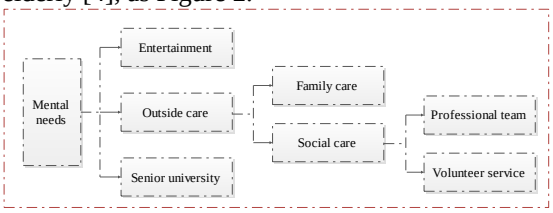

Figure 2 Spiritual needs of the elderly

The spiritual needs of the elderly can be divided into three parts: daily entertainment activities, outside care, and senior university.

The daily entertainment activities are mainly carried out by the community old-age activity center [5]. The care for the elderly generally comes from family care and social care. This article focuses on social care.

There are two parts from the care of the society, part of which is the care of the professional maintenance team. The professional service team has been set up in the information platform of the community home care service in Lubei District and Lunan District of Tangshan City. For example, the Jixian Home Care Service Information Platform currently has 40 professional service personnel, including network centers, call response, distribution centers, social workers' homes, archives, distribution supermarkets, water supply and heating facilities, warehouses, day care centers, etc. All employees must obtain a qualification certificate and need to receive professional training on a regular basis [6]. These professionals provide professional hydropower maintenance, legal aid, medical care, housekeeping services and other daily care services or day care services for the elderly; the other part comes from the care of social volunteers, party volunteers, student organizations, community youth volunteers. Some residents such as community residents and younger people, especially Tangshan City, have universities such as North China University of Technology, and there are enough student groups to carry out volunteer service work, which will play an important role in the care of the elderly [7].

2.2 Medical Needs

For the special group of the elderly, the factors of medical care in the old-age cause are particularly important, and even the focus of many elderly people and their children. In addition to the professional medical staff included in the old-age care institutions mentioned above and the medical service stations for the elderly in the community, the elderly hospitals and hospice care hospitals are also an important part of the medical care conditions in the old-age care industry [8]. Tangshan City has not carried out special elderly hospitals and hospice care hospitals. The Weiguo elderly hospitals, which were opened in 2009, are not found yet. Many Tangshan natives have said that they have not heard of this elderly hospital, indicating that Tangshan is now There is no specific medical institution for the elderly, and further development is needed [9].

2.3 External Factors

The external environment affects people's lives, and economic development has also led to changes in old-age services.

By reviewing the Tangshan Statistical Yearbook, we can draw a trend of per capita GDP growth in recent years, which indirectly reflects the ability to provide material needs and legal and legal protection for aged care services [10].

The value of social welfare is rising, as shown in Figure 6, indicating that the government is paying more and more attention to the issue of old-age care, providing strong support for the supply of old-age services and meeting people's needs to a greater extent.

3. THE CURRENT SITUATION OF THE SUPPLY OF AGED CARE SERVICES IN TANGSHAN CITY

As of 2018, there are 281 old-age apartments in Tangshan, of which 6 have 300 or more beds, and the prices are generally in the range of 500-1000. By reviewing existing survey reports [10], there are many problems with existing pension institutions, mainly focusing on the following aspects:

First, there are fewer beds and poor service facilities. At present, there are only 6 old-age institutions in Tangshan with more than 300 beds, especially in towns and villages. Some small old-age care institutions are basically 50 beds, which is difficult to meet the needs of the elderly. The existing service facilities only provide basic diet and rest, lack of cultural entertainment, medical assistance and other facilities.

Second, it is difficult for the old-age care institutions to have further development. There are two types of pension institutions: public and private. Among the 281 old-age institutions in Tangshan, there are 249 public institutions, accounting for 88.6%, and 32 private organizations, accounting for 11.4%. The public institutions are built by the government, and there is no follow-up development plan. The old-age care industry belongs to the low-profit industry. Therefore, the private organizations have great resistance in raising funds and it is difficult to have follow-up development.

Third, the lack of professional nursing staff, the quality of old-age services is not guaranteed. Among the 281 old-age care institutions in Tangshan, 248 institutions only accept elderly people with self-care ability. Only 33 old-age institutions can receive elderly people who need help services, accounting for 11.7%, which obviously cannot meet the needs of the elderly in Tangshan.

In addition, most of the public pension agencies employ more workers and migrant workers, and there are small nursing homes in their towns and villages. The practitioners lack professional skills training, and there are problems such as over-age and poor service attitude. In addition to being able to take care of the

basic life of the elderly, these practitioners are unable to meet the elderly's needs for spiritual comfort, rehabilitation care and medical care.

4. CONCLUSION

In addition, in terms of old-age care institutions, the counties and districts in Tangshan City have large differences. In the urban area (Lubei District and Lunan District), there are a total of 40 types of old-age care institutions, including 3 with more than 300 beds, 2 with 200-299, and 11 with 100-199. Home, there are 24 homes from 0-99. The old-age care institutions in the urban areas are much better than the towns and towns in terms of scale and facilities. For example, in Weinan County, there are 26 old-age care institutions, of which only the Tongnan County Comprehensive Welfare Service Center and the Tangshan Jingdong Pension Group (medical and nursing combination) have 300 beds, and the remaining 24 are distributed in various townships. Small-scale pension institutions, most of which are about 50 beds. In terms of service content, most of the ready-made old-age care institutions receive older people who are over 70 years old and cannot take care of themselves, and only provide basic life care services.

REFERENCES

[1]YU Peng. Research on the status quo and countermeasures of urban community aged care services in Tangshan City Southwest Jiaotong University, 2017.

[2]Wang Dianzhen. Changes in the Demand for the Aged of Urban Community Residents and the Development of Old Age Policy——Based on the Investigation of Beijing. Research on Ageing, 2017, 5(09): 36-48.

[3]Chang Min. Research on the needs of urban residents' old-age services Northwest University, 2018.

[4]Hou Bing. Research on the level of demand for urban elderly care services in urban elderly and their satisfaction strategies East China Normal University, 2018.

[5]Wang Wei. Empirical study on the purchase of home care services by the Wuhan Municipal Government Wuhan University, 2016.

[6]Zhang Wenzhao. Research on the multi-energy supply model based on rural old-age needs Liaoning University, 2017.

[7]Long Wei. Analysis of the demand and supply of urban old-age resources in China Zhejiang University, 2012.

[8]Zhang Jing. Research on the supply and demand and system selection of rural old-age security in China Hebei University, 2008.

[9]Song Qiuli. Analysis of the economic growth and industrial structure effect of the old-age service industry in Hebei Province Hebei University, 2018.

[10]Xu Guanghao, Cui Ruilan. Introduction and Experience Enlightenment of the Combination of Medical Care and Pension in Shandong Province. Journal of Health Science and Technology, 2019, 33 (04): 9-13.

Research on Dynamic Value of Ecological Service

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Abstract: Ecosystem service cost is an indispensable part of land project cost assessment, which seriously affects the authenticity and comprehensiveness of the land project evaluation. Therefore, this paper mainly establishes the time-varying dynamic level ecological service cost assessment model. After that, using environmental economic value indicator and combining various land areas to research small, medium and large land of three sizes using development project costs. On this basis, we use the particle swarm optimization to optimize, so that we can achieve optimal and true cost benefit.
Keywords: Dynamic hierarchical analysis; Sensitivity index; Land use project; Particle swarm.

1. INTRODUCTION

Traditional economic development ignores the impact of ecosystem services and ideally assumes that the amount of resources an ecosystem can provide is unlimited. But the impact of ecosystem services on economic development cannot be ignored. Costanza [1] divides the ecosystem service function into 17 specific functions and evaluates the ecological functions of each ecological type respectively, making the research on ecological service function a hotspot in ecology. Wang June [2] pointed out that land remediation affects the synergy and trade-offs between ecosystem services; Scholars such as Song Zhenwei [3] quantitatively analyzed the value of ecosystem service functions. This study synthesizes the previous research experience, takes the recognized ecological service value ESV as the measurement standard of model evaluation, combines the spatial analysis module of GIS system, analyzes the spatial scope of different scale regions, and adds the time dimension, carries on the ecological service cost evaluation.

2. ECOLOGICAL SERVICE EVALUATION SYSTEM BASED ON DYNAMIC ANALYTIC HIERARCHT PROCESS

2.1 Dynamic Hierarchical Analysis theory

Dynamic sorting method is to add the time factor to the hierarchical analysis model, establish the judgment matrix with time change, and then add the ecological service evaluation model to a time dimension.

2.2 Constructing Ecological Service Evaluation System

2.2.1 Establish three - layer model of dynamic hierarchical analysis

Based on the above analysis, a dynamic hierarchical analysis model combining dynamic ranking was established to evaluate the cost of ecological services. It is a three-layer structure with regulating services, supply services, support services and cultural services as the target layer. And agricultural land, construction land, unused land, water area and wetland as the measure layer. The evaluation ecosystem service hierarchy is shown in Figure 1:

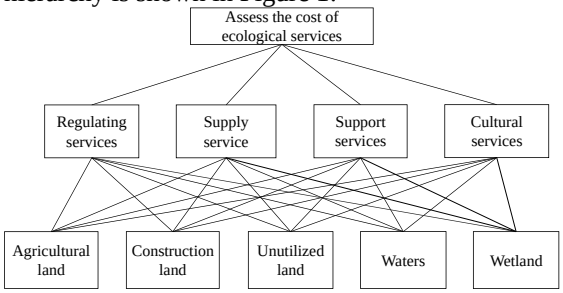

Figure 1 Assess the ecosystem services hierarchy

2.2.2 Construct the initial judgment matrix

In the dynamic hierarchical analysis model, time dimension is added to the judgment matrix, which satisfies the objective law of the change of experts' knowledge and judgment with time.

From the above analysis, let the factor to be compared in the standard layer P be p_i

$$p = \{p_1, p_2, p_3, p_4\} \tag{1}$$

Choose a pair of factors and compare them with each other, at the moment t_0 , the paired comparison judgment matrix A_0 is:

$$A_0 = (a_{ij})_{4\times4} \tag{2}$$

Where a_{ij} represents the ratio of the influence of factor c_i on the target layer to the influence of factor c_j on the target layer, so the judgment matrix A_0 can be determined as a symmetric matrix according to the formula (2) , that is, the influence of factor c_j on the target layer and the influence of factor c_i on the target layer is $a_{ji} = 1/a_{ij}$.

Combined with the problems in this practical study, the standard layer contains a total of 4 elements, and 12 comparative judgments need to be made when the initial judgment matrix is established. By referring to the results of relevant experiments and review articles, the judgment matrix obtained through analysis and comparison is shown in Table 1:

Table 1 The judgment matrix of standard layer and target layer

O	C1	C2	C3	C4
C1	1	5	0.5	3
C2	0.2	1	0.14	0.5
C3	2	7	1	3
C4	0.33	2	0.33	1

2.2.3 Make the judgment matrix dynamic

In terms of time dimension, human factors are the main factors that influence experts to set the weight of comparison factor ranking. Therefore, the logarithmic form is constructed to represent the change rule of the judgment matrix, and the change function of each element a_{ij} in the dynamic judgment matrix is shown in formula (3):

$$a_{ij}(t) = a\ln(t+1)+1 \tag{3}$$

In terms of support services and cultural services, the comparison scale is transformed over time according to formula (3). After consulting temperatures, the change coefficient between pairs of different factors was obtained [4-6], and the dynamic change matrix [5] was obtained as shown in formula (4):

$$\begin{aligned} M(t) &= diag(m_i(t)) = diag(a_i(t)) \\ &= diag(1 \quad 1 \quad 1+0.25\ln(t+1) \quad 1+0.5\ln(t+1)) \end{aligned} \tag{4}$$

Combined with the dynamic change matrix, the O-C layer dynamic judgment matrix is obtained as shown in formula (5):

$$A(t) = M(t)\cdot A_0 \cdot M^{-1}(t) \tag{5}$$

Where initial judgment matrix

$$A_0 = \begin{bmatrix} 1 & 5 & 0.5 & 3 \\ 0.2 & 1 & 0.14 & 0.5 \\ 2 & 7 & 1 & 3 \\ 0.33 & 2 & 0.33 & 1 \end{bmatrix}.$$

2.2.4 Make the weight vector dynamic

When calculated at the time $t = t_0$, the main characteristic root corresponding to the judgment matrix $\lambda_{\max}$ and the feature vectors W_0 is:

$$\lambda_{\max} = 4 \tag{6}$$

$$W_0 = \begin{bmatrix} 0.32 \\ 0.07 \\ 0.49 \\ 0.13 \end{bmatrix}. \tag{7}$$

By synthesizing dynamic transformation matrix, the dynamic change relation of feature vector $W(t)$, namely weight vector, can be obtained as:

$$\begin{aligned} W(t) = W_0 \cdot M(t) &= \begin{bmatrix} w_1(t) \\ w_2(t) \\ w_3(t) \\ w_4(t) \end{bmatrix} \\ &= \begin{bmatrix} 0.32 \\ 0.07 \\ 0.49[1+0.25\ln(t+1)] \\ 0.13[1+0.5\ln(t+1)] \end{bmatrix}, \end{aligned} \tag{8}$$

Where w_1 represents regulating services, w_2 represents supply services, w_3 represents support services and w_4 represents cultural services.

Based on the dynamic change process of the weight vector, the functional expression of the ESV between the evaluation of ecological service cost and regulating services, supply services, support services and cultural services can be obtained as follows:

$$\begin{aligned} ESV &= w_1c_1 + w_2c_2 + w_3c_3 + w_4c_4 \\ &= 0.32c_1 + 0.07c_2 \\ &\quad + 0.49[1+0.25\ln(t+1)]c_3 + 0.13[1+0.5\ln(t+1)]c_4 \end{aligned} \tag{9}$$

3. COST-BENEFIT ANALYSIS BASED ON PARTICLE SWARM IMPROVEMENT

Because the former part of this paper has made clear the proportion of various ecological services in the evaluation of ecological service quality, it is necessary to accurately calculate the cost-benefit of land use development projects of different scales in combination with the economic value of various types of ecological services.

3.1 Constructing the Initial Cost Benefit System

3.1.1 Determining the economic value of equivalent factors

Shegau [6] subdivides the function of ecological services into nine categories includes Gas regulation, Climate regulation, Waste treatment, Keep the soil, Waste Treatment, maintain biodiversity, Food production, Raw material production and Provide aesthetic landscape according to the actual situation in China, referring to the research of Costanza and other scholars. At the same time, he points out that the economic value of 1 equivalent factor is equal to the market value of the average yield of farmland in the region 1/7. The economic value algorithm is shown in Formula (10):

$$E_n = 1/7\sum_{i=1}^{n}\frac{m_i q_i p_i}{M} \quad n = 1,2\cdots \tag{10}$$

In Formula (10), E_n represents the economic value of providing food production and service functions per unit area of farmland Ecosystem (RMB/hm^2). m_i represents the planting area of crop i. q_i represents the yield per unit area of food crop (kg/hm^2) of crop i. p_i represents the food

crop prices (RMB/kg) of crop i . M represents the total area of food crops (hm^2) of crop n . Based on agricultural yield and market price, the economic value of a value equivalent factor of ecological service can be calculated by using the formula.

3.1.2 Determining the ecological value of various types of land

According to the type of land, the land is divided into five categories, namely agricultural land, construction land, unused land (UL), water area (Western Australia) and wetland (WD). Combined with the equivalent factor quantity of various types of land in China, the calculation formula of ecological value of various types of land per unit area can be obtained as follows $x_j = E_n \cdot m_i$.

3.1.3 Analyzing the value of various ecological services

Based on Ding Lilian's analysis, the paper can draw a conclusion that the above four types of ecological services can be expressed more deeply and concretely, as shown in Figure 2.

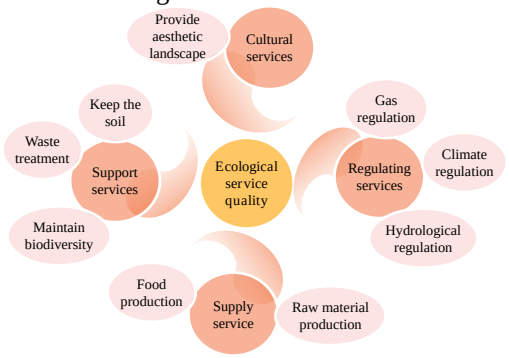

Figure 2 Detailed diagram of ecological service types

Available from Figure 2: The specific calculations of the four types of ecological services are:

$$c_1 = y_1 + y_2 , \tag{11}$$

$$c_2 = y_3 + y_4 + y_5 , \tag{12}$$

$$c_3 = y_6 + y_7 + y_8 , \tag{13}$$

$$c_4 = y_9 , \tag{14}$$

where, c_1, c_2, c_3, c_4 represent the reconciliation service (regulating services), the supply services (support services), the supply service, and the cultural Service (Cultural Services), respectively, $y_1, y_2, \cdots, y_9$ respectively represent the value of ecological services for gas Regulation, climate regulation, hydrological Regulation, maintain soil, waste disposal, maintain biodiversity, food production, production of raw materials and aesthetic appreciation. The value of all kinds of concrete ecological services should be the product of the ecological service value of all kinds of land per unit area and the corresponding various land areas. That

$$y_i = \sum_{j=1}^{5} x_j s_j , \tag{15}$$

where, $s_j = s_0 + at$, s_0 represents the land area for the initial year of the study, a represents the annual growth rate, and t represents the time experienced from the initial year to the selected year. The data selected in this question is the initial year data.

Considering the weight distribution of four types of services in the first question, the cost-effectiveness of land use development projects is as:

$$ESV = \omega_1 \sum_{i=1}^{3} y_i + \omega_2 \sum_{i=4}^{5} y_i + \omega_3 \sum_{i=6}^{8} y_i + \omega_4 \sum_{i=9} y_i \tag{16}$$

3.2 Benefit and Cost Analysis of Land Projects of Different Sizes

Because land use of different sizes has different degrees of development projects, so in the cost-benefit analysis, first of all, from the scale into small projects, medium-sized projects and large-scale projects, then by the analysis of its cost-effectiveness, and finally compare various types of projects to find out the law of various types of project cost-effectiveness. In this paper, Huaiyuan County, Anhui Province and China in Anhui Province were selected to analyze and solve the research objects.

According to formula (16), the economic value of one equivalent factor is 43578 in Huaiyuan County, 186208 in Anhui Province and 201213 in China.

The data for land use projects of all sizes are added to the formula (16) to calculate their cost-effectiveness separately, and the results are shown in table 2:

Table 2 Land Benefit tables of all sizes

	Huaiyuan County	Anhui Province	China
ESV/RMB	7.57×108	1.22×1011	6.74×1013

As the Table 2 shows: The difference of the cost of land use projects of various sizes is very large, the cost-effectiveness of county-level land use projects is the least, the national land use projects are the most cost-effective, therefore, in the larger land use development projects should pay more attention to the impact of ecological services on the total cost of the project.

3.3 Cost-benefit optimization model based on particle swarm

In order to achieve the best cost-effectiveness, a particle swarm optimization model is constructed. Taking the actual ordering of the four service weights as the constraint condition, the objective function is constructed as follows:

$ESV' = \max\{ESV\}$

$$s.t\begin{cases}\omega_3 \geq \omega_2 \\ \omega_1 \geq \omega_2 \\ \omega_1 + \omega_3 \geq 0.8 \\ \omega_1 + \omega_2 + \omega_3 + \omega_4 = 1 \\ ESV = \omega_1 c_1 + \omega_2 c_2 + \omega_3 c_3 + \omega_4 c_4 \end{cases} \quad (17)$$

In this article, set-up $c_1 = c_2 = 2$. Through multiple iterations to obtain the optimization of the objective function, the optimized weight can be obtained as follows:

$[\omega_1 \quad \omega_2 \quad \omega_3 \quad \omega_4] = [0.34 \quad 0.07 \quad 0.46 \quad 0.13]$.

Therefore, the cost-effectiveness of the land project is calculated in conjunction with the optimized weights, and the calculation results are shown in table 3:

Table 3 Land benefit tables of various sizes after optimization

	Huaiyuan County	Anhui Province	China
ESV'/RMB	7.74×108	1.25×1011	6.87×1013

As the Table 3 shows: After optimization, the cost benefit of land use projects of various sizes has increased in different degrees compared with the original.

4. CONCLUSION

On the basis of fully considering the basic relationship between ESV and various kinds of ecological services, the economic value of equivalent factor is introduced, and combined with the five types of land areas of agricultural land, construction land, unused land, water area and wetland in the whole country, Anhui province and Huaiyuan county, respectively, the optimal and most real cost-benefit of large, medium and small scale land projects in 2015 are obtained as a yuan, b yuan and c yuan respectively.

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REFERENCES

[1]Costanza R, d'Arge R, De Groot R, et al. The value of the world's ecosystem services and natural capital. Nature, 1997, 387(6630): 253.

[2]Wang Jun, Zhong Lina, Ying Lingxiao. A summary of the study on the impact of land remediation on ecosystem services. Journal of Ecology and Rural Environment, 2018, 34(09): 803-812.

[3]Song Zhenwei, Sun Miying, Yang Rongjin, Dou Guangyu, Zhang Yi, Zhang Le. Evaluation of ecosystem service function value of grape industry in the eastern foothills of Helan Mountain, Ningxia. Journal of Applied Ecology: 1-9 [2019-01-28].

[4]Li Yuxin. Study on ecosystem service and ecological occupation in rural tourism. China Agricultural University, 2014.

[5]Xu Shubai. A new dynamic sorting model in hierarchical analysis method. Journal of Systems Engineering, 1986, (02): 42-55.

[6]Lv Mingquan, Wang Yanping, Wang Jijun. Study on land use change and its ecological service value in Wuqi County. Soil and water Conservation Research, 2010, 17(01): 144-148+153.

Design and Implementation of College Students' Graduation Project Management System

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Abstract: The development tools used in the system in this paper are C# and SQL database, in order to collects, processes and counts the graduation projects of colleges. We conducted detailed research and analysis on the management of graduation projects for college academic staff, students and teachers, and in combination with the specific conditions of colleges, divided the functions of each module system. It improves the user experience of the system, realizes fast information retrieval, convenient use, high availability and large available storage. It can effectively master and manages the colleges' graduation projects.
Keywords: SQL language; Database; Graduation Project Management.

1. INTRODUCTION

Computer information technology has a great impact on the development of education. It is manifested in the extensive use of teaching management software. Today's management information system is developing towards network, intelligence and integration. It is an indispensable part of colleges. This paper studies and analyzes the management of graduation projects in colleges, and finds that it has a large workload, complicated process and many management objects. [1] The traditional manual management system has been difficult to meet the requirements of the college's standardized management and the needs of the development of the times. Therefore, the construction of the information management system for college graduation projects is very necessary.

2. SYSTEM DESIGN

2.1 Administrator Authority

Query, modify and delete the project's information of students and teachers.

2.2 Student Authority

Query and modify one's own information.
Select and modify graduation design projects.
Query the selection of graduation design projects.
Query the score of submission.

2.3 Teacher Authority

Query and modify one's own information.
Apply for graduation design projects.
Modify, query and delete the declared graduation design project.
Assess student achievement.

3. SYSTEM FUNCTION MODULE DESIGN

3.1 Personal Information Management Module

This module can realize the query and modification of personal information by administrators, teachers and students. At the same time, it can realize the change of system administrator information, the deletion and update of personnel. It also can replace or change the default password of the system.

3.2 Graduation Project Management Module

This module can realize the addition, deletion and modification of graduation projects. The teacher manages the selection of his students, and registers the student's grades. The students can query their own projects and they can operate the projects they chose.

3.3 Background Management Module

This module uses only the administrator user. The administrator can dynamically manage teachers and students according to the specific situation, which is the basis of the whole system.

4. DATABASE DESIGN

The database management system enables centralized management of data, controls redundancy, improves data utilization and consistency, and facilitates application development and maintenance. The actual design process of the database is to transform the real-world model into a data form. This is not only the core of the database system operation, but also an important part of the development and construction of information systems.[2]

4.1 System Function Requirements Analysis

4.1.1 Analysis of administrator needs

The administrator manages the teachers and students and synchronizes the database to get the system up and running.

4.1.2 Analysis of teacher needs

Teachers need to complete the functions of declaration, modification, addition and deletion of graduation design projects and so on. As well as the management of personal information and the results are assessed based on the graduation design projects selected by the student and the completion status.

4.1.3 Analysis of student needs

Students are required to select, modify, and query graduation design projects after the teacher declares the graduation design project. As well as the management of personal information and the final grade of the graduation design.

4.2 Structural Design

Based on database requirements analysis, database concepts and logical design, a database named Gmds was designed. The database consists of a number of tables. The more important ones are the graduation design project table, the student information table, the teacher information table, and the graduation design grade table. Among them, graduation design project, Teacher, Student, Class, Department, and administrator can be modeled as a basic entity set.

5. SYSTEM INTERFACE DESIGN

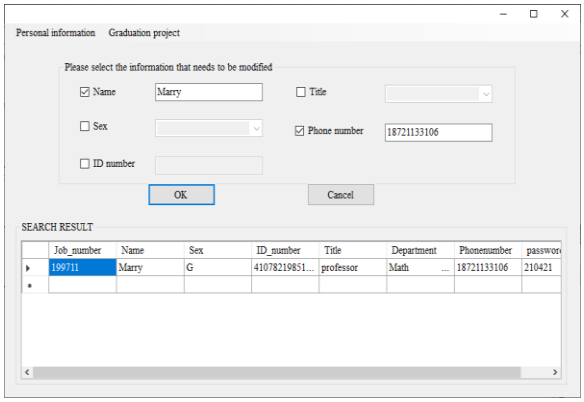

Figure 1 part of the form interface design

After the database is established, the interface design of the graduation design project management system is performed using VS2010 software. In order to protect the information data of teachers and students, the system requires the user to input a user name and password when logging in, as Figure 1. The password defaults to the last six digits of the user ID number, thereby enabling different types of users can enter different main pages. Only administrators can enter the backstage system with their usernames and passwords, and can add and delete teachers and students [3].

6. CONCLUSION

With the rapid increase in the number of college students and the enrichment of courses, universities urgently need a database management system to access and manage a large amount of relevant information. Therefore, in order to ensure the smooth flow of school information and efficient work, the graduation project management system came into being. This not only saves the teaching staff from cumbersome management, but also plays a very important role in promoting the development of teaching.

REFERENCES

[1]Zhang Yu. Design and implementation of educational administration system in colleges and universities. Nanchang University, 2018.

[2]Zeng Guoqing. Design and Implementation of Book Management System. Information and Computer (Theoretical Edition), 2018 (17): 101-103.

[3]Chang Ying, Zhu Qinghua, Jia Yanjun. Database Design in Student Management System. Education and Teaching Forum, 2012, (38): 244-245.

The Evaluation Method of Bus Mobile Payment Problem

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Abstract: As third-party payment platforms are ubiquitous, there are a series of social problems. Aiming at this kind of problem, this paper puts forward the solution of travel payment. Firstly, we get people's payment trend through big data analysis, and then establish a business profit model based on analytic hierarchy process to analyze various factors, to get the optimal solution.
Keywords: Third-party payment; Platform trend analysis; AHP limit analysis method.

1. INTRODUCTION

As an important means of transportation [1], the payment method of bus has attracted extensive attention from the society due to the accelerated pace of life and rapid development of science and technology. Just because of the emergence of "mobile payment", the third-party payment platform [2] has also emerged. In the form of the explosive growth of the third-party payment platform [3], the development trend of mobile payment can be accurately determined, which will take the lead in the commercial position. The trend analysis method happens to be able to complete the development prediction of mobile payment.

By screening and processing the data segment, formula (1) is firstly used to obtain the percentage of the payment method used by the passengers in this city.

$$X = \frac{x_n}{\sum_{i=1}^{n} x_i} \tag{1}$$

Secondly, according to formula (2), the development trend of various payment methods used by commuters in this city is obtained.

$$\bar{x} = \frac{\sum_{i=1}^{n} x_i}{n} \tag{2}$$

2. MODEL BUILDING

Through the analysis of the third party platform of profit, profit factor affecting the third-party payment [4] platform mainly include fees, service charges, interest income and advertisement cost four factors precipitation funds, in addition, the traffic is every day the number of bus in the city, the company plan has a direct impact on the four main factors that indirectly affect the earnings of third-party payment platform [5].

3. SOLUTION OF THE MODEL

Through a series of formula to poundage, advertisement fee, the interest income of precipitation [6] fund.

(1) Whether online or offline, handling fees are one of the traditional ways of making profits for third-party payment platforms. It has many services for individuals and enterprises, such as cash withdrawal, payment, security prompt, refund, etc. which can be counted by data accumulation and sum model.

$$Q = \mu \sum_{i=1}^{n} Fi \tag{3}$$

F = the amount paid by a customer through a third-party payment platform;
I = 1,2,3... N;
N = total number of customers;

(2) In real life, the Internet and mobile clients owned by the third-party payment platform will charge various users' advertising fees. The advertising fees charged by different partners are different [7], but the advertising fees are one of the main sources of profit. Therefore, they should be an important source of the profit model of the third-party payment platform. One of. Using f1k, f2k... Fxk denotes the advertising contracts that different types of business partners need to pay, x denotes the Xth type of partners [8], and n denotes the number of partners owned by this type. The following formulas are obtained by sorting them out

$$\alpha = \sum_{x=1}^{n} f_{1k} + \sum_{x=1}^{n} f_{2k} + \cdots \sum_{x=1}^{n} f_{xk} \tag{4}$$

Thus, the revenue of advertising fees can be increased by increasing partners.

(3) Sedimentary funds here refer to the money to be paid in advance received by the payment institution to handle the payment business entrusted by the customer [9]. This part of the funds refers to the funds other than the deposits made by customers in the form of current deposits to meet the daily payment. They can be deposited in demand deposits, unit time deposits, contractual deposits or other forms approved by the People's Bank of China [10], but the term of deposits does not exceed three months. The income from current deposit accounts for about 5% of the total revenue of the platform, but if the third-party payment platform has prepaid card license, it will be able to achieve better fund precipitation, and account for 70-80% of the total card issuance.

$$\beta = f_{1j}{}_{i=0}^{n} + f_{2j}{}_{i=0}^{n} + \cdots f_{mj}{}_{i=0}^{n} \tag{5}$$

The hierarchy reflects the relationship between factors, but the criteria in the criteria layer do not necessarily

have the same proportion in the objective measurement, they each occupy a certain proportion.

When determining the proportion of factors affecting the profitability of third-party payment platforms [11], it is not easy to quantify the proportion of these factors. Therefore, when directly considering how much these factors affect earnings, the decision maker will often come up with data that is inconsistent with the degree of importance he thinks, or even a set of data that may have implicit contradictions, due to inconsiderate consideration. In order to provide reliable data, Saaty et al. suggested a pairwise comparison of factors to establish a pairwise comparison matrix. The results of the total hierarchy sort are shown in Table 1.

Table 1 The results of the total hierarchy sort

guidelines		poundage	The service fee	advertising	Interest income of deposited funds	Total sort weights
Criteria layer weights		0.1792	0.3561	0.2897	0.1750	
Measure layer single sort weight	Passenger traffic	0.1160	0.2461	0.1643	0.4376	0.2864
	Payment scheme	0.6531	0.1692	0.0986	0.0791	0.3894
	The company plan	0.1382	0.3546	0.1430	0.3642	0.3242

According to the total ranking weight of the hierarchy, it can be clearly seen that among the factors influencing the payment of the third-party platform [13], the weight of the payment method is 0.3894, which has the greatest impact on the payment profit of the third-party platform. Therefore, the biggest factor affecting the payment of the third-party platform is the payment method.

4. MODIFICATION OF PAYMENT PROFIT MODEL FOR THIRD PARTY PLATFORM OF PUBLIC TRANSPORT

The above profit model of third-party platform [12] payment of public transport is obtained under ideal conditions. However, considering that in real life, public buses are affected by the prevalence of private cars, the emergence of some Shared public transport equipment and the reduction of travel costs, it is difficult to reach the ideal conditions of this model. Therefore, by introducing the equilibrium coefficient ρ, the modified model can be obtained as follows:

$$K_1 = \eta_1 * Q + \eta_2 * \alpha + \eta_3 * X + \eta_4 * \beta + \omega$$

$$\mathrm{K} = \rho(K_1 + K_2) = \rho(\eta_1 * Q + \eta_2 * \alpha + \eta_3 * \beta + \omega + K_2) \quad (6)$$

In this case, the model can be better applied to the profitability of third-party platform payment.

5. ESTIMATE THE PROFITABILITY OF THE CITY WHEN IT REALIZES THE THIRD-PARTY PLATFORM IN AN ALL-ROUND WAY

Based on the trend analysis method and comparative [13] analysis method adopted in Question 1, we can conclude that the city has been in the past four months. In the case of mobile payment for bus and subway installation, the fuzzy evaluation model established by Question 2 can be simple. Evaluate the best profitability of third-party platform payment in the city in recent years. In this paper, we need to estimate the profit of the whole city after the third- party payment of public transport. We will introduce the "limit analysis method" through reasonable mathematical analysis. By integrating and evaluating a small amount of data, a large number of phases can be reasonably deduced the characteristics of related data.

The limit function is as follows:

$$K_3 = K_1 * C_1 + K_2 * C_2 \quad (7)$$

C_1, C_2 are the weights of two kinds of income in total income respectively. Entropy can be used to determine the two weights of the problem entropy power law$C_1 = 0.84, C_2 = 0.16$.

When the third party mobile payment platform establishes the operation plan, it can be calculated according to the specific situation of passenger volume in the sample. The actual value of K_3 is the benefit of using the platform comprehensively in this city. Benefit Value and Actual Situation to be calculated comparisons show that the errors are within the forgivable range, so the model considers all factors of profitability. The impact. However, due to the limited sample data, some errors will inevitably occur, but the errors are within the predictable range. Therefore, the simulation results of this model can be used as an important reference for the third-party mobile payment platform.

6. CONCLUSION

Through the discussion of the whole problem and the analysis of the model established [14], it is suggested that under the basic operation of the platform, the tripartite platform can reduce service fees and handling fees and provide more convenience. Fast payment method, attract more passengers to use the third-party platform to pay, so as to get more users. The most important thing is to carry out reasonable innovation, expand the applicable population of this payment method, and make it more stable. Based on stability, we should increase its novelty [15], attract more advertising partners, and improve the profitability of the platform from all aspects.

REFERENCES

[1]Cheng Xiaowei. Challenges and Countermeasures of urban passenger transport in Guangzhou. Lanzhou University, 2017.

[2]Guo Ming. Development status and policy recommendations of third-party payment industry in China. Modern economic information. 2010, (18): 22-24.

[3]Dai Jiaxian. Relevant research on third-party payment - a theoretical overview. Business culture (academic edition), 2009 (04): 54.
[4]Pan Xinping. Understanding Third Party Payment. Financial Electronization, 2008, 04: 38-39.
[5]Wang Jing. Profit Model of Third Party Electronic Payment in China. Hohhot, Inner Mongolia University, 2011.
[6]Li Qi. Profit Model of Internet Financial Platform. Southeast University, 2016.
[7]Zhang Xiaolin. Based on the Revision Level Analysis of China's Oil Trade Risk. University of Foreign Economic and Trade, 2014.
[8]Fang Yanjie. Research on the Impact of Third Party Payment on Consumer Perceived Risk in Electronic Commerce. Central South University of Forestry Science and Technology, 2012.
[9]Li Fang. Dialysis of "Third Party Payment Sedimentary Funds" in Electronic Commerce. Times Finance. 2007, (12): 33-35.
[10]Lin Mao. Research on interest rate risk measurement of commercial bank accounts. Southwest University of Finance and Economics, 2010.
[11]Zheng Qiping. Analysis of secure payment strategy for electronic commerce. Electronic commerce, 2007 (07):70-73.
[12]Chen Ke. Group decision-making method based on uncertain fuzzy judgment matrix and order relationship. Zhongnan University, 2010.
[13]Cai Jingbo. Research on Index System of Service Evaluation of Government Websites. Jilin University, 2013.
[14]Wu Junqi. Analysis of Competitiveness of Chinese Commercial Banks Based on Factor Analysis. Jilin University, 2017.
[15]Rong Ling. Research on Competitive Strategy and Industrial Regulation of Third Party Payment Platform. Fudan University, 2012.

Express Handling Problem Research

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Abstract: This article is based on the 2019 Tianjin University of Technology "Innovation Cup" mathematical modeling competition title background. By adopting the idea of structural loop and timeless loop, the range of values of the number of machines is first determined. Then through the analysis of the actual situation of the critical value. Finally, the conclusion that four existing machines should be added is obtained.
Keywords: FPGA; High-speed Information Processing; X-ray energy spectrum.

1. INTRODUCTION

With the development of the network, online shopping has become one of the main purchase methods. The primary task of the logistics company is to send the corresponding goods to the next transfer station as soon as possible and through various procedures, and finally to the consumers [1-3]. Different courier processing equipments correspond to different work efficiency and cost. How to arrange the courier processing equipment reasonably is a problem that the logistics company must solve.

2. EXPRESS PROBLEM RESEARCH

The data used in this paper is derived from the 20th issue of the "Innovation Cup" Mathematical Modeling Competition of Tianjin Polytechnic University in 2019. First, pre-process the known data and eliminate the abnormal data, make the data flat [4-8]. Considering the impact of time and other unknown factors on the data, using the moving average method preprocess the data to eliminate as much as possible the impact of most unknown factors on the data. In the known data, the three-day (in hours) shipment arrival number is defined as a sequence $\{y_1, y_2 \ldots\ldots y_t\}$, which is processed based on the sequence:

$$y_t = \frac{1}{N}\left(y_t + y_{t-1} \ldots + y_{t-(N-1)}\right).$$

We provide N=60, A new data sequence that is smoothed by the formula $\{y_1', y_2' \ldots y_t'\}$.

It can be observed from the figure that the number of pieces per hour and the number of pieces processed per hour of the machine are relatively stable. Not much fluctuations over a long period of time, Therefore, the respective average values are used instead of the corresponding number of pieces per hour and the amount of machine processing per hour, as Figure 1.

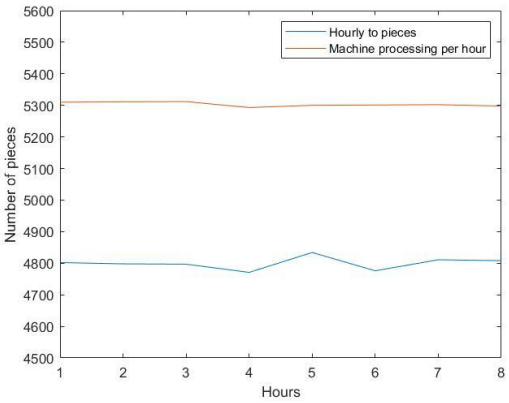

Figure 1 comparison of machine processing and shipment quantity

For the actual situation, since the time is an infinitely long amount, the time at which the shipment arrives can be divided into an infinite number of cycles, based on which there must be no unprocessed shipments after the cycle [8-10]. Since the machine processing time takes 9 hours as a cycle, it is only necessary to ensure that the processing is completely processed by the machine in a period in which the total time of arrival of the shipment is three days, that is, the above situation can be satisfied. According to this, the conditions for the working efficiency of the machine should be met, as Figure 2.

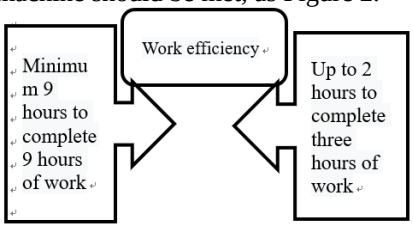

Figure 2 Machine efficiency condition chart

Under the premise of clear working efficiency interval, we analyze the time period with the most constraints from 11:00 to 21:00, as Figure 3.

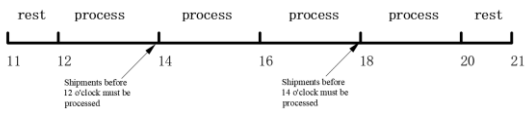

Figure 3 Machine processing conditions and time

In order to facilitate theoretical analysis, the number of shipments of 11-21 points is indicated by M_{n-m} in

this paper. In the above picture, 11:00 to 20:00 is a 9-hour period, and 11:00 to 12:00 is the minimum limit for machine processing. In this paper, the method of express loop processing is used. When the time is from 12 o'clock to 14 o'clock, the accumulative amount of the shipment reaches one hou M_{11-12} and the partial shipment amount M_{12-14} is processed. Make the amount of shipments before 12 o'clock before 14 o'clock. In the same way, the amount of shipments to be processed is left to the next point in time, so that the shipments before 16 o'clock can be processed before 18 o'clock. Therefore, if all the shipments within three days are processed, it is guaranteed that there is no surplus in the circulation within the 9 hours.

3. CONCLUSION

Under the condition that the machine work efficiency meets the premise, the constraints of each time period can also be properly met. Calculate the required number of machines is 4.

REFERENCES

[1]Cia-Hin Lau, Jonathan Weng-Thim Ho, Pik Kwan Lo, Chung Tin. Targeted Transgene Activation in the Brain Tissue by Systemic Delivery of Engineered AAV1 Expressing CRISPRa. Molecular Therapy - Nucleic Acids, 2019, 16.

[2]Yan-Ping Zhu, Chen Li, Xiao-Yuan Wan, Qian Yang, Guo Si Xie, Jie Huang. Delivery of plasmid DNA to shrimp hemocytes by Infectious hypodermal and hematopoietic necrosis virus (IHHNV) nanoparticles expressed from a baculovirus insect cell system. Journal of Invertebrate Pathology, 2019, 166.

[3]Miller Netanella, Asali Aula Atamna, Agassi-Zaitler Moran, Neumark Eran, Eisenberg Michal Matzkin, Hadi Efrat, Elbaz Michal, Pasternak Yael, Fishman Ami, Biron-Shental Tal. Physiological and psychological stress responses to labor and delivery as expressed by salivary cortisol: a prospective study. American journal of obstetrics and gynecology, 2019.

[4]Zhu Yan-Ping, Li Chen, Wan Xiao-Yuan, Yang Qian, Xie Guo Si, Huang Jie. Delivery of plasmid DNA to shrimp hemocytes by Infectious hypodermal and hematopoietic necrosis virus (IHHNV) nanoparticles expressed from a baculovirus insect cell system. Journal of invertebrate pathology, 2019, 166.

[5]Huizhen Wang. Operation Analysis of Existing Delivery Mode at the End of Express Industry. Proceedings of the 2019 3rd International Forum on Environment, Materials and Energy (IFEME 2019), 2019.

[6]Fan Yang. Analysis of Factors Affecting Service Quality of Chinese Express Delivery Companies. Proceedings of the 1st International Symposium on Economic Development and Management Innovation (EDMI 2019), 2019.

[7]Zhitan Feng, Jin Chen, Hui Shen. Construction of Customer Loyalty Evaluation System for Express Delivery Enterprises. Proceedings of the 1st International Symposium on Economic Development and Management Innovation (EDMI 2019), 2019.

[8]D. V. Lindley. The theory of queues with a single server. Mathematical Proceedings of the Cambridge Philosophical Society, 1952, 48(2).

[9]J. Kiefer, J. Wolfowitz. On the theory of queues with many servers. tran, 1955, 78(1).

[10] Thomas L. Saaty. Résumé of Useful Formulas in Queuing Theory. Operations Research, 1957, 5(2).

Comparison Analysis of Usage in SWIFT

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Abstract: Swift is a new programming language for iOS and OS X apps. Swift adopts safe programming patterns and adds modern features to make programming easier, more flexible, and more fun. Swift has become one of the most popular programming languages in the world and as Apple said it is still in developing. However, little is known about how Swift developers perceive these benefits. We will analyze the comparison by creating the same project in iOS and Android. As Apple said, Swift's syntax is more simplified because it does not use pointers and includes improvements in its data structures and in its syntax.
Keywords: Apple, iOS, SWIFT, Comparison of programming language

1 BACKGROUND

1.1 The 2015 Top Ten Programming Languages

It is hard to say what is the best language in the world or which is the most popular one. It depends on the project, environment, and such things. Languages are tools, and what's a "must have" in one domain can be a "whatever" in another. But IEEE Spectrum has teamed up with a computational journalist to give you a popularity ranking.

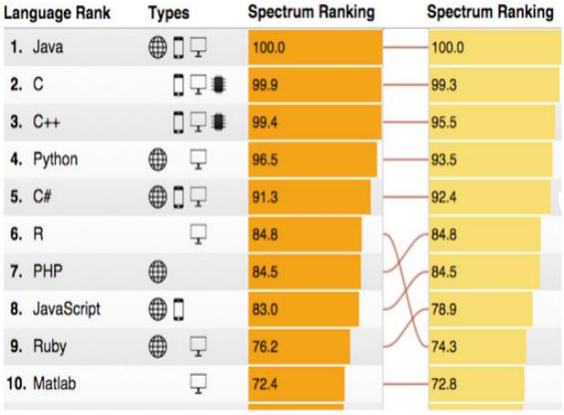

Figure 1. Language rank in 2015 [1]

As we can see in figure 1, the big five—Java, C, C++, Python, and C#—remain on top, and it is also the first year that Swift entered the rankings. As a new language released only 13 months.

1.2 Apple's Swift is the Fastest-Growing Programming Language

In March 11, 2018, presented by Kavita Iyer. "Apple's Swift makes it into top 10 programming languages." These rankings are based on pull requests in GitHub, as well as an estimated count of how many times a language is tagged on developer knowledge-sharing site, Stack Overflow.

RedMonk said that Swift, Apple's language which is primarily intended for Apple operating systems (iOS, macOS, watchOS, and tvOS) has been growing at an "incredible rate". It has managed to climb up 44 places in RedMonk's language rankings in the latter half of 2017. It has also managed to reach the top 10 rankings in under four years at a record pace [2].

2 COMPARISON OF USAGE IN SWIFT

2.1 Syntax

2.1.1 Swift is Clear and Readable

Swift is Apple's programming language and developed from Objective-C. However, Swift is more friendly to users and more modern. It has the power of low-level programming languages such as C or C++, and the fluency of high-level languages such as C# or JavaScript. In addition, Swift is light and comes with a pre-defined library.

First of all, to get a taste of Swift programming language, let's take a look at the following code snippets.

Objective-C:

```
const int count = 10;
double price = 23.55;
NSString *firstMessage = @"Swift is awesome. ";
NSString *secondMessage = @"What do you think?";
NSString *message = [NSString stringWithFormat: @"%@%@", firstMessage, secondMessage];
NSLog(@"%@", message);
```

Swift:

```
let count = 10
var price = 23.55
let firstMessage = "Swift is awesome. "
let secondMessage = "What do you think?"
var message = firstMessage + secondMessage
print(message)
```

The first part is the code of Objective-C while the second part is the code of Swift. As we can see, the second part, the code of Swift, is much clearer and readable. The type is easy to define and there is even no semi-colon at the end of the statement (you can have it it's also right).

2.1.2 Constants and Variables

In programming, constants and variables are two basic elements. In Swift, you can declare variables with the var keyword and constants with the let keyword. Here is an example for that:

```
let constant = 10
var y = 10
var x = y + constant
```

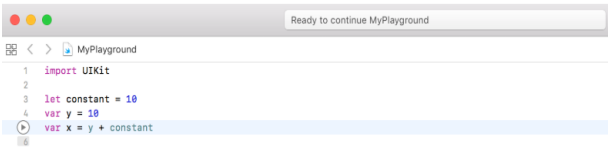

Figure 2. The result of the equation

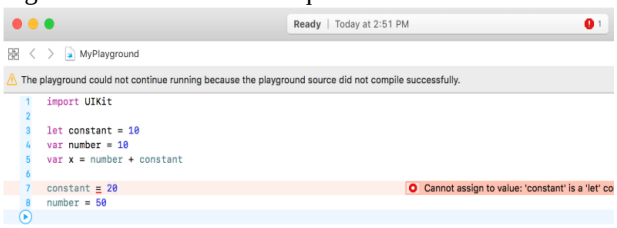

Figure 3. Errors in Playgrounds

2.2 Environment - Xcode

One of the most different things between Swift and other programming language is the environment. We know that Swift is popular but only few developers doing that, the critical reason is the environment. IOS developing can only be done by Xcode which is only run in Mac operating system. So, first of all, if you want to build an IOS application, you need an Apple computer to run Xcode.

XCode is an integrated development environment introduced by Apple in 2003. And now the latest version of XCode is version 10(as figure 4). Xcode provides developers with many supports such as: a full package, UI designing, implementing and testing. Runtime is the most powerful feature of XCode, it can continuously track and alert developers about syntax bugs, designing recommendations and memory management.

FIGURE 4. Xcode GUI

2.3 Comparison of IOS and Android with Same Application

In our lab, we created an application that is highly innovative and useful for students in both IOS and Android. Binnet Musayev who is a master student of ELTE Computer Science, is responsible for the Java application; I am responsible for the Swift application.

After a careful discussion, we decide to build an application similar to Symbaloo, it is useful to students, especially the Computer Science students in ELTE.

It is shown as figure 5:

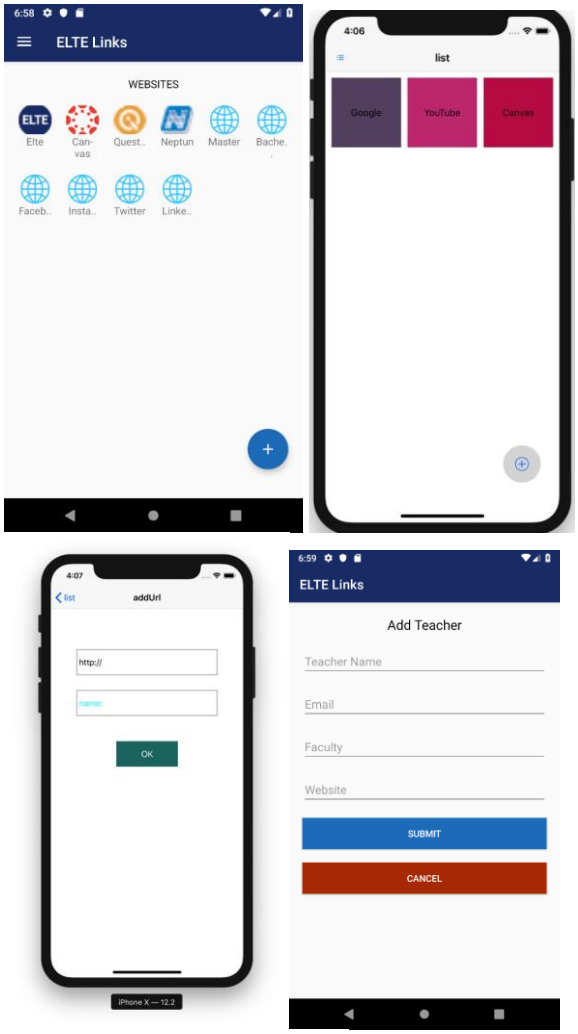

Figure 5. Layouts of application

The comparison of two applications is most like the comparison of Java and Swift.

2.3.1 Philosophy

When we build by Java, there should be 5 primary goals in mind:

1. It should use the object-oriented programming methodology.
2. It should allow the same program to be executed on multiple operating systems.
3. It should contain built-in support for using computer networks.
4. It should be designed to execute code from remote sources securely.
5. It should be easy to use by selecting what was considered the good parts of other object-oriented languages.

Swift's primarily goal was to greatly simplify the software engineering process:

1. No semicolons required.
2. No header files to manage.
3. Type inference.
4. Functions are first class citizens. Null pointer exceptions are not possible via the use of optional.
5. C-style enumeration for (int i = 0; i < size; i++) is not allowed [3].

2.3.2 Advantages in Swift

Designing the User Interface:

One of the most advantages of Swift is Designing the User Interface. Most developers say that the beauty of iOS development is the separation of code (.swift file) and user interface (storyboards). First, you can choose any of the UI objects, and drag-and-drop them into the view.

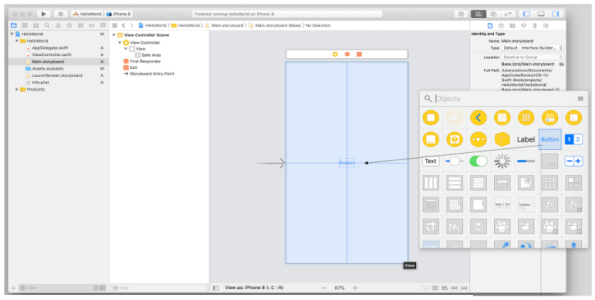

FIGURE 6. Drag the Button to the View [4]

Then establish the relationship between the source code and the user interface. Press the control key and drag it to the View Controller icon. Then a pop-up you can select to connect with your code.

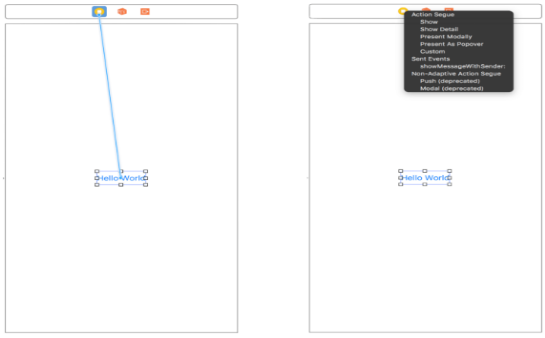

FIGURE 7. Drag to the View Controller icon (left), a pop-over menu appears when releasing the buttons (right) [4]

That is how Swift connect the UI with source code. It's quite convenient for developer to design the user interface.

More concise:

When we discuss about the syntax of Swift, I have said that Swift is more concise. Compare with Java, Swift's syntax is much easier, readable and less-complex.

In java, there are 8 primitive types:

```
int i = 123;
double d = 3.79712412443257E308;
float f = 5.1234567E38;
long l = 9,223,372,036,854,775,807;
short s = 32,123;
boolean b = true;
byte bte = 127;
char c = 'c';
//Some reference types
String str = "blala";
Scanner scan = new Scanner();
Random rnd = new Random();
Integer num = new Integer();
```

In Swift, there are type inference:

```
let □ = "Smile"
let num = 21
  //Type aliases
typealias AudioSample = UInt16
var maxAmplitudeFound = AudioSample.min
//Booleans
let orangesAreOrange = true
let orangeAreApples = false
  //Optionals
  var myDog: Dog? = Dog()
```

2.3.3 Advantages in Java

More libraries:

Java as a big 5 programming language in the world, has a longer history than Swift. Even Swift is a fresh language, more 'modern' than Java, the advantage of Java is its age. As a long-time developed language, Java has more third-party libraries than Swift. One can find libraries for nearly anything in Java. There are very few languages that have the depth of libraries as Java has.

More support:

It is also an advantage of Java's age when you trying to build an application, errors and exceptions are unavoidable. There are always some detail errors or strange exceptions that you cannot find a solution in books, then you need to find support online. As the number of Java developers is much more than Swift's, you will find that get support in Java is much easier than Swift. This can help you solve problems more quickly and easier.

Exception handling:

If Swift hits an error, you can end up crashing, Java won't. For servers that have to stay up, Java is much better.

2.3.4 Significance of Comparison

In the real world, the two languages don't really compete. If you are going to make an IOS application, then you need Swift; If you are doing Android developing, then choose Java. Both languages have their own use and situation.

However, the comparison of two language is not meaningless. Mobile devices nowadays take up more and more space in our lives, both Android and IOS developing is popular. If a developer wants to make choice between them, then it is important for him to realize the comparison of them. On the other hand, if a developer only familiar with one of them, then comparison may help him to learn the other faster and easier.

3 FEATURES AND FUTURE OF SWIFT

Swift is a popular and fast-growing language in recent years, therefore there is an increasing number of researchers work on Swift development. And Swift is also in developing by Apple company. In this chapter, we will pick up opinions of recent paper of Swift to analyze the features of it. And by analyzing the development of Swift, we will also look into the future of Swift.

3.1 Swift/T

With the growing technological expansion of the world, distributed systems are becoming more and more widespread. It contains multiple nodes that are physically separate but linked together. "However, the centralized single-node evaluation model of the previously developed Swift implementation limits scalability." [5]

Then here comes Swift/T, it is a new data flow language implementation designed for extreme scalability. Its technological innovations include a distributed data flow engine that uses data flow-driven task execution to balance the program evaluation of a large number of nodes. Swift/T extends the Swift data flow programming model to make the system in distributed way which makes system more efficient and faster for a huge task. "Thus, Swift/T provides a scalable parallel programming model for productively expressing the outer levels of highly parallel many-task applications." [5] The figure 8 shows the benefits of these advances considering the Swift code fragment.

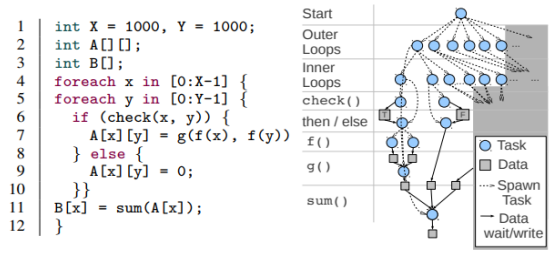

FIGURE 8. Simple data flow application [5]

"Previously, the single-node Swift engine would perform the work of sending these leaf function tasks to distributed CPUs at < 500 tasks/sec. The new Swift/T architecture, in contrast, can distribute the evaluation of the outer loop to many CPUs, each of which can in turn distribute the inner loop to many additional CPUs." [5]

This example clearly shows how Swift/T make system efficient in distributed way. The result of their tests shows that Swift/T can already scale to 128K compute cores with 85% efficiency for 100- second tasks.

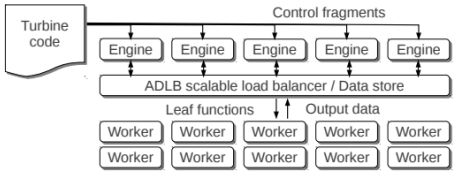

FIGURE 9. Architecture of Swift/T runtime: Engines evaluate Swift language semantics; workers execute leaf-task applications [5].

3.2 Prospect of Swift

As an emerging programming language, Swift is still at the beginning of its journey. Although it has a lot of advantages as a 'modern' language, it needs much development not only by Apple company but by developers as well. Swift/T and Tifig are both good examples of developing Swift. With the contribution of developers, Swift is becoming completer and more perfect, which will attract more developers to join the team of developing Swift. In this way, the brilliant future of Swift is clearly visible.

4. CONCLUSIONS

Swift is a 'modern' programming language, it has many advantages as an emerging language, such as the syntax is concise, the code is cleaning-look and readable, user-friendly and easy to learn. We analyze the comparison. Firstly, introduce the syntax of Swift, make the simple code to appear the feature of Swift such as no semi-colon, type inference. Compare with Objective-C which was the primary language for IOS developing, can clearly see the benefit of Swift, the improvement of Apple company. Secondly, introduce the environment of Swift, which the most significant difference. In the last, we compare the same project built in both IOS and Android as an example to compare the difference between Swift and Java developing. Swift has a lot of advantages like an emerging language, but it also has a limitation. The range of users and the extensions of the library still need improvement.

REFERENCES

[1]The 2015 Top Ten Programming Languages. URL: https://www.csee.umbc.edu/courses/undergraduate/202/spring16_marron/lectures/l01/the_2015_top_ten_programming_languages.pdf

[2]Open Sourcing Programming Language - Case Apple Swift. URL: https://pdfs.semanticscholar.org/34e5/6a279f1175141314c3f8db8c6807d6311a33.pdf

[3]DEVELOPING AN IOS APPLICATION FOR VALUE STREAM MAPPING WITH SWIFT. URL: https://pdfs.semanticscholar.org/7662/07e79d5b1882e3ec1ac98dbc270e59bb6078.pdf

[4]Beginning iOS 12 Programming Swift. URL: https://www.appcoda.com/learnswift/

[5]Swift/T: Scalable Data Flow Programming for Many-Task Applications. URL: http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.718.2708&rep=rep1&type=pdf

Selection and Maintenance Method of Mining Hoisting Wire Rope

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Abstract: The mine hoisting wire rope is an important part of the mine hoisting equipment. It cooperates with the mine hoist to complete the task of decentralizing personnel, equipment, materials and lifting ore and vermiculite. In addition, the occurrence of shaft lift system accidents is mostly caused by the breakage of the wire rope. Therefore, whether the selection, use and maintenance of the wire rope is reasonable is an important part of improving the safety, reliability and economic operation of the equipment, and should be paid enough attention. This paper introduces the method of selecting the wire rope and the daily maintenance method to promote the safe operation of the mine lifting system and reduce the probability of accidents.
Keywords: lifting wire rope; lifting equipment; safety

The purpose of the hoisting wire rope is to suspend the lifting container and transmit power. When the hoist is running, the wire rope drives the container to run in the wellbore. Wire ropes are subjected to various stresses during operation, such as static stress, dynamic stress, bending stress, contact stress, extrusion stress and tumbling stress, which have a direct impact on the service life of the wire rope. In addition, the wire breakage, rust and loss of metal cross-sectional area appearing during the use of the wire rope are also the main reasons affecting the service life of the wire rope. Therefore, as an equipment manager, it is necessary to master the correct wire rope selection method and strengthen the maintenance during daily use so as to ensure the safe operation of the wire rope[1-3].

1. STRUCTURE AND CLASSIFACATION OF LIFTING WIRE ROPE

The hoisting wire ropes are all wire-strand-rope structures, that is, the wire is twisted into strands and then stranded into strands. There is a core when the steel wire is stranded, and there is generally a rope core when the strand is formed into a rope. Usually the core is a steel wire, and the core is a metal core and a fiber core. Lifting wire ropes have different classification methods according to their different characteristics. According to the direction of the strands in the rope, it is divided into left-handed steel wire rope and right-handed steel wire rope; according to the radial relationship between the steel wire in the strand and the strand in the rope, it is divided into interactive direction wire rope and the same direction wire rope; The contact situation is divided into three types: point contact, line contact and surface contact; according to the shape of the cross section of the strand, the round, triangular and elliptical strands are divided.

2. LIFTING WIRE ROPE SELECTION METHOD

When selecting a wire rope, it is considered according to the conditions of use and the characteristics of the wire rope.

Firstly, the type of steel wire rope is selected according to the conditions of use: In the wellbore with high water pH and high alkalinity and as the wind well, the steel wire rope with galvanized steel wire rope and relatively large steel wire diameter should be selected; In the mine with serious wear, select Round or stranded steel wire ropes with external thick line contact may also be selected for surface contact with steel wire ropes; When bending fatigue is the main cause of damage, wire contact or triangular strand steel wire rope shall be preferred; shallow wells have selected low tensile strength, deep wells Select the steel wire rope with high tensile strength; Use the steel wire rope for the sinking well to choose not to twist the steel wire rope. When the depth of the friction hoist is more than 900m, choose not to twist the steel wire rope.

Secondly, the diameter of the wire rope needs to be selected, mainly based on the ratio of the diameter of the drum or friction wheel to the diameter of the wire rope, the ratio of the diameter of the drum or friction wheel to the diameter of the thickest wire in the wire rope. Winding hoist, the ratio of the diameter of the reel to the diameter of the steel rope should meet the following requirements: not less than 80 in the well and not less than 60 in the well; the ratio of the diameter of the reel to the diameter of the thickest steel rope in the steel rope should meet the following requirements: 1200, the underground is not less than 900. The ratio of the diameter of the friction wheel to the diameter of the wire rope of the floor type and the tower type friction hoist with the guide wheel should not be less than 90 in the well and should not be less than 80 in the well; the diameter of the friction wheel of the tower type friction hoist without the guide wheel The ratio of the diameter of the wire rope should not be less than 80 in the well and should not be less than 70 in the well. The ratio of the friction wheel diameter of the friction hoist to the diameter of the thickest steel wire in the wire rope shall not be less than 1200 in the well; the downhole shall not be less than 900. Depending on the

diameter of the reel or friction wheel we can calculate the range of wire rope diameters that meet the above requirements.

After selecting the type and diameter of the wire rope, it is necessary to check the safety factor of the selected wire rope. The safety factor of the hoisting wire rope is divided by the maximum breaking force of the wire rope divided by the maximum static tension of the wire rope. The maximum breaking force of the wire rope can be generally inquired about the technical parameters provided by the wire rope manufacturer. The maximum static tension is calculated according to the lifting height, the weight of the wire rope, the weight of the lifting container and the load capacity. According to the "Safety Regulations for Metallic Non-Metallic Mines", the safety factor for lifting the wire rope suspension shall comply with the following requirements: The single rope winding type lifting wire rope is dedicated to the lifting personnel not less than 9; for lifting personnel and materials, when lifting personnel Less than 9, no less than 7.5 when lifting materials; not less than 6.5 for lifting materials. For multi-rope friction lifting wire rope: not less than 8 for lifting personnel; not less than 7.5 for lifting materials; not less than 7 for lifting materials; calculate the safety factor of the wire rope to be selected and select the wire rope that meets the requirements of the regulations. An economical and reasonable wire rope is selected to meet the above technical requirements. When purchasing steel wire ropes, it is necessary to select steel wire ropes produced by enterprises with mining reinforced wire rope production qualifications to ensure that the product quality of wire ropes meets the standard requirements.

3. LIFTING WIRE ROPE MAINTENANCE AND REPAIR METHOD

By the correct method, selecting the wire rope suitable for the on-site use conditions of the mining enterprise is the first step to ensure the normal operation of the lifting system. Since there are many factors in the use of the wire rope, the life of the wire rope is reduced, so the daily maintenance work of the wire rope must be highly valued.

The following points must be met in routine maintenance:

It is strictly forbidden to use cloth strips, such as cotton yarns, to be tied to the wire rope for use as a lifting depth indicator. This will affect the lubrication of the wire rope here, and it is prone to rust and lead to broken wire.

Check the diameter reduction of the hoisting rope every day, and stop using it immediately when the reduction reaches 10% of the diameter of the rope.

In addition to daily inspections, detailed inspections should be conducted once a week and a full inspection once a month. When it is found that the ratio of the broken wire area to the total wire area of the wire rope reaches 5%, it should be replaced immediately.

When the wire rope is subjected to violent pulling force such as a can or sudden stop during operation, stop the operation immediately and check it. Replace the case if it is severely distorted or subjected to a violent tension for a length of 0.5% or more.

The wire rope suddenly increases or the elongation increases during use, and should be replaced immediately.

If the wire rope is severely corroded, or the pitting pit forms a groove, or the outer wire is loose, it should be replaced immediately regardless of the number of broken wires or whether the diameter changes.

For friction hoists, the first rope should be replaced as long as one does not meet the requirements.

The wire rope should be tested regularly according to the requirements of the regulations during the service period. The test can only be used after it has passed the test. Otherwise, it should be replaced immediately.

In addition, pay attention to the inspection of the rope head and the rope card, and check the broken wire and corrosion at the place. Here, the lubrication condition of the rope is not good, and it is easy to cause the wire rope to be fatigued and broken at a premature time.

Maintenance of the wire rope in use is mainly to regularly lubricate and oil the wire rope. This protects the external wire from rust. It acts as a lubricant to reduce wear between the strands and the strands and between the filaments and the filaments. At the same time, it can prevent moisture and moisture from immersing in the rope and supplement the grease with the core.

For the maintenance of the friction hoist wire rope, it is necessary to use Goep oil or grease to prevent the wire rope from corroding and to increase the friction between the wire rope and the friction wheel.

4. CONCLUSION

By strengthening the management during the use of the hoisting wire rope, the accident rate caused by the wire rope will be reduced, which will provide a strong guarantee for the safety of mine employees and the safe production of mining enterprises.

REFERENCES

[1]Cheng Jushan, “Mining Machinery;” China University of Mining and Technology PRESS, 2005.

[2]Wu Changyou, Yu Hui, “Mine Fixed Machinery and Transport Equipment,” Beijing Jiaotong University PRESS, 2013.

[3]Li Xiaofei, Xue Jianguang, “Safety Interpretation of Metal and Nonmetal Mines,” Changjiang PRESS, 2006.

Design and Application of User Portrait System Based on Passengers' Reservation Records in the Travel Website

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Abstract: Combining with the service requirements in one travel reservation website and the system status, this paper applied the big data technology to design the booking passengers' user portrait system including system architecture, label system and its implementation. In particular, the concept of travel chains is proposed, and data mining and analysis methods are used to extract and quantify the transfer behavior of passengers. Based on this, the paper explored the system application, put forward the application methods and ideas in passenger behavior analysis, precision marketing and data value-added service. It is beneficial for travel reservation website to provide more refined services for customers, and can provide support for transportation department in traffic planning and decision-making.
Keywords: Portrait; Precision marketing; Big data application

1. INTRODUCTION

With the popularity of mobile applications and the rapid development of e-commerce, more and more passengers choose to book air tickets, train tickets and long-distance inter-city bus tickets on the travel website. The maturity of big data technology and industry form also provides strong support for the realization of data-driven and business innovation of travel website. At present, various travel websites, such as Ctrip, Qunar, and Tongcheng, have formed offline telephone reservations, and online reservations through personal computer and applications on the smartphone. On the basis of existing big data technology, many services including user portraits, precision marketing, and extension services can be achieved on the internet plus industry.

The user portrait system is a data model for modeling the user behavior in real life, and describes users in different data dimensions[1]. By modeling and analyzing the main information such as the user's demographic attributes and behavioral preferences, the set of all labels of an individual user is obtained, and the overall features of the user are outlined. Then, the users are classified and their behaviors can be predicted according to their attributes or label sets, so specific purposes can be achieved, such as credit rating, audience types and so on. The deepest meaning of user portraits is the on-demand customization of specific customers based on user data and behavior. In the big data analysis, the specific user groups are classified and analyzed to form attribute labels of different dimensions, and different business behaviors and measures can be adopted to achieve specific goals[2-5]. At present, in the aviation, telecommunications, banking and internet industries, many companies have established and applied user portrait systems, which have achieved good results in improving user experience, precision marketing, and efficiency improvement[6-7].

This paper explores the user portrait system of passengers who booking air tickets, train tickets, inter-city long-distance bus tickets on a travel website. The browsing behavior and reservation records of passengers are collected. Using statistical model, text mining, machine learning and other technologies, the massive data can be transformed into simple, image and understandable labels. Through docking with the application system, personalized services, data value-added services and other businesses can be supported in the travel website. With the help of the data, the travel website can enhance the customer service capabilities and core competitiveness. There are numerous passengers booking records in the travel website, and the travel records of passengers taking airplanes, trains and buses can be extracted. Data mining and analysis methods can be used to accurately extract and quantify the passengers' transfer behavior of domestic passengers, which provides quantitative support and decision-making for traffic planning.

2. ARCHITECTURE DESIGN OF PASSENGER USER PORTRAIT SYSTEM

User portrait system of passengers who booking tickets on the website relies on linear scalable computing storage resources provided by the basic operating environment. The system uses Hadoop-based big data architecture[4-6], and collects and aggregates internal and external data to provide real information application programming interface for integrated advertising delivery subsystem, data analysis subsystem and online trading subsystem. The

system supports precise advertising and customer recommendation services, as shown in Figure 1. The system mainly includes as follows: Implementation for the basic operating environment of big data computing and storage, data aggregation and data analysis of the system. Acquisition system for passengers' booking records and passengers' user behavior data on the travel website. Business platform for the definition, management, calculation, analysis and presentation of passengers' user portrait labels. Data service interface platform for interacting with the external systems.

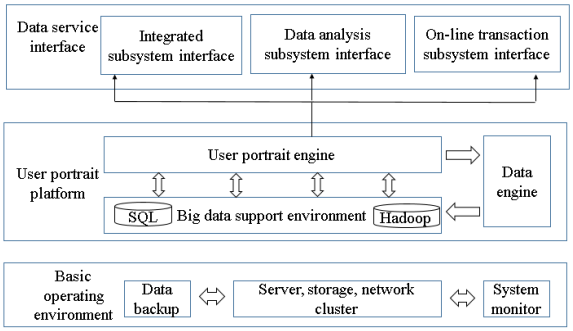

Figure 1 Architecture of passenger user portrait system

The user portrait platform is composed of three parts, which are the basic layer, label layer, and view layer. The label layer provides external label services, and the basic data layer provides label generation indicators, dimensions, and rules, which is as shown in Figure 2.

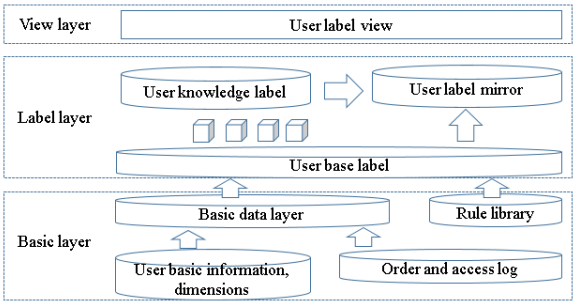

Figure 2 Composition structure of user portrait platform

3. REALIZATION OF PASSENGERS' USER PORTRAIT SYSTEM

The user portrait is the set of labels of user information, which can be obtained to analysis and conversion from user's original data to user label. Through the analysis and mining of the aggregated massive users' data, every user's feature label set is formed, and the data service based on user's feature label is provided. Its core work is labeling for users, and one of the important purposes of labeling is to make people understand and make it easier for computers to process. Labels are usually highly refined features that are artificially specified, which can be easily understood, and it is convenient to extract and aggregate analysis.

Constructing a user portrait label system includes the following steps.

3.1 Data Source Analysis

Building user portraits is the restoration of user information, and the data sources should be included all the data relating to the user. Through the analysis of the passengers' booking records, the data is divided into static data and dynamic data according to the characteristics of the labels. Static data includes population attribute, social attribute, account attribute and so on; dynamic data includes transportation for each trip (airplane, bus, train), and ticket purchase, payment, inquiry, consulting behavior, etc.

3.2 Label Design

Label and label rules need to be defined artificially. By identifying the objectives and analyzing the data, the corresponding label is defined, and the user is finally labeled. According to the different implementation methods and application scenarios of user portrait labels, the labels of passengers' user portrait system can be divided into basic feature label and user knowledge label.

Basic features of passengers exist objectively. By collecting and integrating relevant data of users, the basic attributes of user characteristics are reflected, which mainly include five categories of basic information, consumption capacity, complaints, business travel characteristics, browsing behavior, etc. Basic features of passengers are shown in Figure 3.

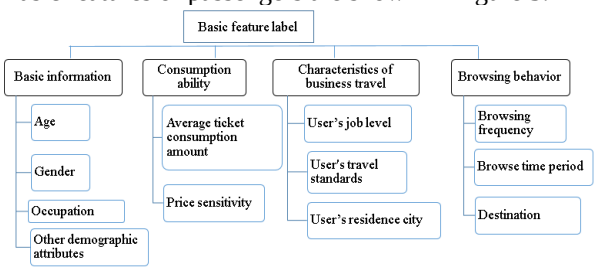

Figure 3 Basic features of passengers

Knowledge labels refine and mine users' behavior and rules, and acquire more abundant and potential customer knowledge based on existing data, to help understand customers comprehensively and stereoscopically. Knowledge labels can be divided into destination preference, interest preference, channel preference and product preference. Knowledge labels of passengers are as shown in Figure 4.

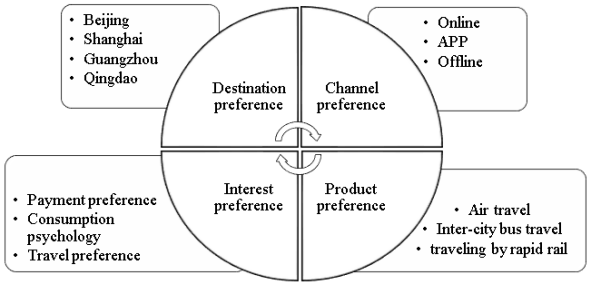

Figure 4 Knowledge labels of passengers

In particular, the passengers' travel chain can be explained in this way. Passengers usually arrange

their trips according to their own wishes or activities generated as a part of society, while various social activities or livelihood needs will generate a variety of space-time movement, which forms a travel chain by connecting the various activities of passengers with trips. Passengers travel to their destinations, in some cases, due to the restriction of the road network, and they are unable to reach their destinations by taking one ride. They can fly to an easy-to-reach city and then transfer to the destination by bus or by train. The labels related to the transfer behavior can be added for the passenger.

3.3 Label Implementation

Label implementation is a process of data modeling and process, that is, according to the defined label, to determine the way to add user's label. According to the user's basic feature labels, a suitable model or algorithm is used to generate specific knowledge labels. The modeling methods of passengers' user portrait system include direct value selection, statistical analysis, business rules, prediction model and other types. Construction method of knowledge labels is shown in Figure 5.

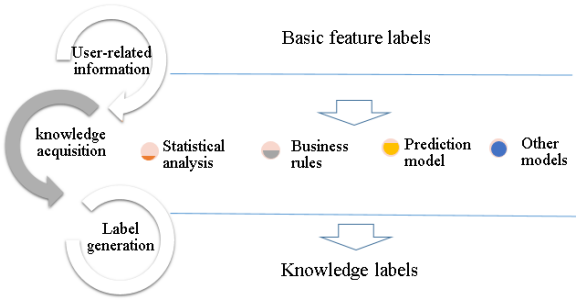

Figure 5 Construction method of knowledge labels

The technology of passengers' user portrait system including off-line Map Reduce/Hive, quasi-real-time spark, data mining programming technology of R/python/sparkmllib and other data processing technologies. Data mining results are stored in Hbase and Elastic search fast retrieval engines, and it provides fast access to data service interface.

4. THE APPLICATION OF PASSENGERS' PORTRAIT SYSTEM

The portrait system of the passengers booking tickets on the travel website has been designed and built with a complete set of labels. The set of labels contains many facets, such as basic attributes, travel behavior attributes and purchase behavior attributes. The basic attributes include the passenger's name, gender, age and the residence city. The travel behaviors include the travelling frequency, the departure city, the destination city, and the level of seats. The purchase behaviors include the payment method, the refund and ticket changing status, the travelling pattern, the consumption behavior and the potential consumption behavior.

The passengers' portrait system can help the employees in business department to understand the customers' preference. There are many applications of the passengers' portrait system.

4.1 The Analysis of Passengers' Behavior

With analysis of the passengers' structure, the behavior of products selection, passengers' ticket purchase behavior and passengers' travelling behavior, the relationship between the characteristics of collective passengers, individual passenger and the products sold on the website can be discovered. Each analysis item can be extended to more detailed items.

4.1.1 The structure of passengers

Through analysis from the user portrait system, we can get the composition of the passengers, which can provide data support for product design of travel website.

For example, we can get the sex ratios of passengers, the distribution of residences of passengers, the distribution of the passengers' age, proportion of passengers travelling by a various means of transport, and the proportion of tickets.

4.1.2 Analysis of passenger's choice of products

What kind of transportation passengers choose to travel will be affected by many factors. It is useful to analyze the influence factors from passengers' selection.

Through the following analysis, analysis of the means of transport used by passengers, seats level analysis of passengers' selection, analysis of departure time of passengers, and analysis of passengers' travelling distance, the analysis result can provide an important basis to the follow-up product design.

4.1.3 Analysis of passengers' purchasing behavior

Through the analysis of passengers' purchasing records, characteristics of passengers' booking behavior can be discovered. We can provide better service and more exact products to the passengers.

The analysis items are as follows, analysis of payment methods, analysis of ticket types (pass, joint, and the round trip), the regular pattern analysis of refund a ticket, and the regular pattern analysis of tickets altering time.

4.1.4 Analysis of passengers' travelling behaviors

By analyzing the passengers' travelling behaviors, the key passengers can be found, and better services can be provided for them, thus the passengers' travel experience can be enhanced.

The analysis items are as follows.

According to the travel purpose, we use the reasonably designed model to divide the purposes into tourism, business, and student.

According to the passengers' travelling frequency, we can group the passengers and get more potential passengers.

With analysis of passengers' travelling distance, we can use the clustering model to divide the passengers into several reasonable groups.

4.2 Precision Marketing

The passengers' user portrait system is built, and the passengers are labeled with multi-dimension labels such as population attributes, travel behavior and

purchase behavior. We can find the specific group passengers by selection and clustering the labels in the user portrait system, and we can design products to match their requirements and advertise for them. We use the user-based collaborative filtering algorithm to achieve precise recommendation of products.

The method of similarity calculation for passengers' labels[8-9] is as follows:

$$sim(u_i, u_j) = \sum_k w_k sim(profile_k(u_i), profile_k(u_j)) \quad (1)$$

w_k is the weight of the kth quantitative label, and $sim(profile_k(u_i), profile_k(u_j))$ is the similarity of the k-th quantitative label between user u_i and user u_j.

4.3 According to the label of the user's portrait, make a personalized home page for each user. When users use search pages to search for products, the website server calls user portrait interface under search query, according to user's consumption ability and habits, realizes personalized sorting of product list pages, and it will reduce the time cost for users to select products. When a user calls to book a ticket, the telephone system calls the user portrait interface to judge whether the user is a high-value customer or not, and the telephone call of high-value customers is transferred to the high-skill telephone operators, which can improve the service satisfaction of the users.

4.4 The Application of Travel Chain Behavior Analysis

Based on the statistical analysis of all passengers' transfer records, we can get the passenger volume of every transfer city, and the data analysis results can be provided for passengers, which can help them to improve travelling efficiency. With the analysis of the passengers' transfer records, we can monitor the passenger flow distribution in the transportation hub. Based on the history monitor data, the transportation department can forecast the passenger flow in the future and take corresponding countermeasures to optimize traffic network. By analyzing the passenger's individual travel chain and travel method, the accessibility and reliability of the aviation, train and bus network can be quantified.

5. CONCLUSION

This paper applied the big data technology to design the booking passengers' user portrait system. In particular, the concept of travel chains is proposed, and data mining and analysis methods are used to extract and quantify the transfer behavior of passengers. Based on this, the paper explored the system application, put forward the application methods and ideas in passenger behavior analysis, precision marketing and data value-added service. It is beneficial for travel reservation website to provide more refined services for customers. The application of travel chains behavior analysis can provide support for transportation department in traffic planning and decision-making.

ACKNOWLEDGMENTS

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REFERENCES

[1]Deng, Lei, J. Gao , and C. Vuppalapati, Building a Big Data Analytics Service Framework for Mobile Advertising and Marketing, IEEE First International Conference on Big Data Computing Service & Applications IEEE, 2015.

[2]Tang J, Yao L, Zhang D, et al., A Combination Approach to Web User Profiling, ACM Transactions on Knowledge Discovery from Data, 2010, 5(1):1-44.

[3]De Roure D C, Middleton S E, Shadbolt N R, Ontological user profiling in recommender systems, ACM Transactions on Information Systems, 2004, 22(1):54-88.

[4]Iglesias J A, Angelov P, Ledezma A, et al., Creating Evolving User Behavior Profiles Automatically, IEEE Transactions on Knowledge and Data Engineering, 2012, 24(5):854-867.

[5] Peña, Paula, Hoyo R D, VeaMurguía, Jorge, et al., Collective Knowledge Ontology User Profiling for Twitter - Automatic User Profiling.// IEEE/WIC/ACM International Joint Conferences on Web Intelligence, IEEE Computer Society, 2013.

[6]Kim J Y , Collins-Thompson K , Bennett P N , et al., Characterizing Web content, user interests, and search behavior by reading level and topic// Proceedings of the Fifth International Conference on Web Search and Web Data Mining, WSDM 2012, Seattle, WA, USA, February 8-12, 2012, ACM, 2012.

[7]Mezghani M, Zayani C A, Amous I, et al., A User Profile Modelling Using Social Annotations: A Survey// WWW. ACM, 2012.

[8]Kostek B, Kaczmarek A, usic Recommendation Based on Multidimensional Description and Similarity Measures, Fundamenta Informaticae, 2013, 127(1-4):325-340.

[9]Jia S, Shijia E, Li M , et al., Chinese Open Relation Extraction and Knowledge Base Establishment, ACM Transactions on Asian and Low-Resource Language Information Processing, 2018, 17(3):1-22.

Influencing Factors of Logistics Capability of Food Manufacturing Enterprises of the Improved DEMATEL Method Based on Trapezoidal Intuitionistic

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Abstract: Correct identification and evaluation of the influencing factors of logistics capacity is the key way to enhance the logistics capacity of food manufacturing enterprises. Based on the logistics characteristics of food manufacturing enterprises, the conceptual model and system framework of the factors affecting the logistics capacity of food manufacturing enterprises are constructed, and the specific internal influence factors and external influence factors of the influencing factors are constructed. On this basis, DEMATEL method based on trapezoidal intuitionistic fuzzy number is used for empirical analysis and evaluation of the influencing factors of logistics capability of food manufacturing enterprises, internal influencing factors include food quality assurance ability, flexibility, innovation ability, information level of logistics system, external factors include food standards and consumer demand. The research provides theoretical reference and practical guidance for further rational identification and enhancement of logistics capabilities of food manufacturing enterprises.

Keywords: Logistics capability; Influencing factors; Improved DEMATEL based on trapezoidal intuitionistic fuzzy number

1. INTRODUCTION

In recent years, food manufacturing enterprises have developed rapidly, formed a certain market share, and made certain contributions to economic development. However, the logistics costs of food manufacturing companies have been high, and the logistics costs of fresh foods are already catching up with the cost of sales. The standardization of food logistics is not in place, the logistics quality assurance system is weak, and the logistics system is lacking. It is also an urgent problem for food manufacturing enterprises. Therefore, how to enhance the logistics capability of food manufacturing enterprises has become one of the topics of common concern in the theoretical and practical circles. The research results of the theoretical and practical circles show that the construction of a reasonable food manufacturing enterprise logistics capacity influencing factors system and conceptual model. The use of reasonable methods to empirically identify and evaluate the influencing factors of the logistics capabilities of food manufacturing enterprises has become an effective means and means to enhance the logistics capabilities of food manufacturing enterprises, too. Scholars at home and abroad of food manufacturing enterprise logistics capability factors are studied[1-17], has obtained certain achievement, but the existing research results at home and abroad, the lack of food manufacturing enterprise with unity and systematic system and the concept model of logistics capability factors, more empirical analysis method is used for the lack of empirical identification and evaluation of food logistics enterprise logistics capability factors related research results, using the improved DEMATEL method based on trapezoidal intuitionistic fuzzy number empirical evaluation and identification of food manufacturing enterprise logistics capability factors relatively few literature achievement. In view of this, based on the logistics characteristics of food manufacturing enterprises, the conceptual model and system framework of the factors affecting the logistics capacity of food manufacturing enterprises, the specific internal influence factors and external influence factors of the influencing factors are constructed. On this basis, using the trapezoidal intuitionistic fuzzy number to improve the DEMATEL method for empirical analysis, empirical analysis and evaluation of the internal influence factors and external influence factors of the food manufacturing enterprises' logistics capabilities. The research provides theoretical reference and practical guidance for further rational identification and enhancement of logistics capabilities of food manufacturing enterprises.

2. FACTORS AFFECTING THE LOGISTICS CAPACITY OF FOOD MANUFACTURING ENTERPRISES

Reference to relevant literature[1-17],the factors affecting the logistics capabilities of food manufacturing enterprises include internal and external factors, including internal food quality assurance, flexibility, innovation, logistics system information, food quality assurance, flexibility, the ability to

innovate and the degree of informatization of the logistics system all have positive effects on the logistics capabilities of food manufacturing enterprises. The external factors include food standards and consumer demand. Food standards and consumer demand are positive for the logistics capacity of food manufacturing enterprises. The system framework and conceptual model of the factors influencing the logistics capabilities of food manufacturing enterprises are shown in Figure 1.

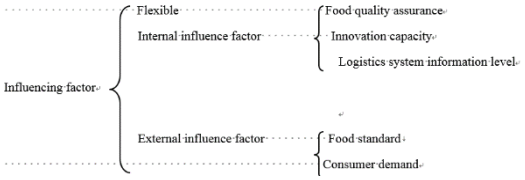

Figure 1 System framework and conceptual model of influencing factors of logistics capability of food manufacturing enterprises

3. EMPIRICAL ANALYSIS OF FACTORS AFFECTING LOGISTICS CAPABILITY OF FOOD MANUFACTURING ENTERPRISES

3.1 Sample Selection and Data Collection

3.1.1 Data collection

The questionnaire is mainly for the evaluation of the six evaluation indicators of the logistics capacity in the form of matrix scores according to the questionnaire requirements. After the questionnaire design is completed, the preliminary draft of the questionnaire will be submitted to the relevant professionals for evaluation, the problems unrelated to the research content will be removed, and the background information of individuals and enterprises will be added, Questionnaires are distributed to logistics distribution managers of representative and typical food manufacturing companies.

In order to ensure the quality of the questionnaire and ensure the recovery rate and efficiency, after consulting the relevant references, a simple random sampling method is finally determined, and 15 questionnaires are sent to the middle and senior management personnel of the logistics management in the enterprise. The survey method and recovery status were as follows: 5 questionnaires were distributed on the on-site questionnaire survey, 5 questionnaires were collected, 2 questionnaires were distributed by mail survey and 1 questionnaire was collected, 5 questionnaires were distributed in the network survey, and 4 questionnaires were collected. The telephone survey distributed 3 questionnaires and 2 questionnaires were collected. In summary, a total of 12 questionnaires were collected, and the questionnaire recovery rate was 80%. The ungrouped and uncovered questions in the questionnaire were excluded. The number of valid questionnaires in the questionnaire was 10, and the effective rate was 83.33%. Refer to Appendix II for the company name corresponding to the valid sample.

3.1.2 Data statistics and organization

According to the questionnaire survey, the factors affecting the logistics capacity of food manufacturing enterprises include the following six. The guarantee of food quality is expressed by F1, the flexible F2 is used, the innovation ability is expressed by F3, the degree of information of the logistics system is represented by F4, the food standard is represented by F5, and the consumer demand is expressed by F6. The score is specifically s9, indicating that the degree of influence is extremely large. s8 indicates that the degree of influence is large, and s7 indicates that the degree of influence is too large. s6 indicates that the degree of influence is slightly better. s5 indicates that the degree of influence is general, and s4 indicates that the degree of influence is slightly worse. The influence degree of s3 is too small, and the degree of influence is small with s2. The degree of influence is very small with s1, and it has no effect with s0. According to the questionnaire survey, the experts judge the possibility of the maximum and minimum influences on the degree of influence between the elements, construct an expert's intuitive evaluation set R, and organize the expert's visual evaluation diversity.

3.2 Empirical Analysis Method Selection

3.2.1 Improved DEMATEL method advantages based on trapezoidal intuitionistic fuzzy numbers

DEMATEL method does not need to estimate the parameters in advance, which has the advantages of avoiding subjective factors and reducing errors. However, when traditional DEMATEL method evaluates the influence relationship between complex system elements, due to the fuzziness of feature evaluation information, it is uncertain to reflect expert judgment. Therefore, DEMATEL's method based on trapezoidal intuitive fuzzy number is used to improve the influence degree of language variables that can be converted from "fuzzy" to expert's intuitive evaluation [1-6].Through evaluation, the ambiguity of the explicit comprehensive relationship affects the matrix, and the causes and centralities of various impact factors in the system are obtained. In this way, when evaluating the influence relationship between complex system elements, it is possible to solve the problem of uncertainty in the evaluation information ambiguity and expert judgment [1-6].

3.2.2 Modeling steps to improve the DEMATEL method based on trapezoidal intuitionistic fuzzy numbers

Based on the trapezoidal intuitionistic fuzzy group theory and its related definitions and calculation steps, this paper combines the calculation process of DEMATEL method and constructs the improved DEMATEL method based on trapezoidal intuitionistic fuzzy numbers. This method converts expert evaluation into trapezoidal intuitionistic fuzzy numbers for standardization, integration, and clearing, solving the DEMATEL method and complex system problems and improving the degree of agreement [1-6]. Refer to and draw on the relevant literature, the modeling steps of the method are as follows [1-6]:

Step 1: Determine the influencing factors. Determine the set of influencing factors of the system. If there are n factors to be evaluated in the system F, then $F=\{f_1,f_2,...,f_n\}$.

Step 2: Establish an expert intuition score set. Building a decision-making team with m experts P= {P1, P2, Pm}. s_i and s_t respectively indicate that each expert in the team actually judges the influence relationship between any two influencing factors fi and fj when evaluating the problem, and $h_{ij}^k=\{s_{ij}^k,S_{ij}^k\}$ is used to represent the range of influence degree of factor i on factor j that expert k intuitively thinks, s_{ij}^k represents the minimum possible influence degree of factor i on factor j that expert k thinks, use S_{ij}^k to represent the maximum possible influence of factor I on factor j that expert k thinks. Then m experts believe that the judgment result of factor i to factor j can be represented by strategy vector $\tilde{h}_{ij}=\{[s_{ij}^1,s_{ij}^2,...,s_{ij}^m],[S_{ij}^1,S_{ij}^2,...,S_{ij}^m]\}$ .Based on this, the decision results of m experts to assess the influence degree of various factors in the system constitute the $R=(\tilde{h}_{ij})_{n\times n},i,j=1,2,...,n$ score set of expert intuition, as shown in Table 1.

Table 1 Nine-level language evaluation set of trapezoid fuzzy number transformation

Fuzzy language level	Fuzzy language representation	Trapezoidal fuzzy number
s1	Minimal impact	(0,0,0,1/9)
s2	Very small impact	(0,0,1/9,2/9)
s3	Less impact	(0,1/9,2/9,3/9)
s4	Less affected	(1/9,2/9,3/9,4/9)
s5	General impact	(2/9,3/9,4/9,5/9)
s6	A little better impact	(3/9,4/9,5/9,6/9)
s7	Greater influence	(4/9,5/9,6/9,7/9)
s8	Very influential	(5/9,6/9,7/9,8/9)
s9	Great influence	(6/9,7/9,8/9,1)

Step 3: fuzzy the expert intuition score set.

The term set of uncertain language evaluation given in Table 1, after the trapezoidal fuzzy processing of expert intuition score set, R is obtained. The expression of the intuitionistic fuzzy number of the element h_{ij}^k in R can be expressed as trapezoid after being fuzzy is $T^k=\{[(u_{ij}^k)_a,(u_{ij}^k)_b,(u_{ij}^k)_c,(u_{ij}^k)_d],[(v_{ij}^k)_a,(v_{ij}^k)_b,(v_{ij}^k)_c,(v_{ij}^k)_d]\}$. After sorting out, the decision vector can be expressed as $T_{ij}=[T_{ij}^1,T_{ij}^2,...,T_{ij}^m]$ .Thus, the unweighted intuitionistic fuzzy influence matrix $\tilde{X}=(\tilde{T}_{ij})_{n\times n},i,j=1,2,...,n$ of expert opinion is obtained.

Step 4: Construct a direct relationship fuzzy influence matrix.

The $w=(w_1,w_2,...,w_m)$ is given to the experts of the expert group. After the decision vector of the expert group is weighted according to the trapezoidal intuitionistic fuzzy number operation rule, the expert group's decision opinions can be converted from a set of fuzzy numbers to a single fuzzy number $\hat{T}_{ij}=\{[\hat{u}_{ij}^a,\hat{u}_{ij}^b,\hat{u}_{ij}^c,\hat{u}_{ij}^d],[\hat{v}_{ij}^a,\hat{v}_{ij}^b,\hat{v}_{ij}^c,\hat{v}_{ij}^d]\}$.

Step 5: standardize the direct relation fuzzy influence matrix.

Calculate the membership parameter normalization parameter λ_u and the non-membership function normalization parameter λ_v:

$$\lambda_u=\frac{1}{\max\sum_{j=1}^{n}\hat{u}_{ij}^d}\ 1<i<n$$

$$\lambda_v=\frac{1}{\max\sum_{j=1}^{n}\hat{v}_{ij}^d}\ 1<i<n$$

The direct relation fuzzy influence matrix $\hat{X}$ is normalized and calculated to obtain the standard direct relation fuzzy influence matrix $\bar{X}$. $\bar{X}$ is calculated as follows:

$$\bar{u}_{ij}^o=\lambda_u\times\hat{u}_{ij}^o\ o=a,b,c,d$$

$$\bar{v}_{ij}^o=\lambda_u\times\hat{v}_{ij}^o\ 1\le i,\ j\le n\ o=a,b,c,d$$

$$\bar{X}=\left\{\begin{array}{l}[[\bar{u}_{ij}^a]_{n\times n},[\bar{u}_{ij}^b]_{n\times n},[\bar{u}_{ij}^c]_{n\times n},[\bar{u}_{ij}^d]_{n\times n}]\\ [[\bar{v}_{ij}^a]_{n\times n},[\bar{v}_{ij}^b]_{n\times n},[\bar{v}_{ij}^c]_{n\times n},[\bar{v}_{ij}^d]_{n\times n}]\end{array}\right\}$$

Step 6: Calculate the comprehensive relationship fuzzy influence matrix.

From the standard direct relationship fuzzy influence matrix $\bar{X}$,the comprehensive relationship fuzzy influence matrix $\breve{X}$ can be obtained, and $\breve{X}$ is calculated as follows:

$$[\bar{u}_{ij}^o]_{n\times n}=[\bar{u}_{ij}^o]_{n\times n}\times[I-[\bar{u}_{ij}^o]_{n\times n}]^{-1}\ o=a,b,c,d$$

$$[\bar{v}_{ij}^o]_{n\times n}=[\bar{v}_{ij}^o]_{n\times n}\times[I-[\bar{v}_{ij}^o]_{n\times n}]^{-1}\ o=a,b,c,d$$

Step 7: Calculate the comprehensive relationship impact matrix.

The comprehensive relationship fuzzy influence matrix $\breve{X}$ is clarified, and the comprehensive relationship influence matrix $\hat{X}$ and $\hat{X}$ are calculated as:

$$\bar{v}_{ij} = \sum_{o=a}^{d} \frac{\bar{v}_{ij}^{o}}{4} \quad 1 \le i,\ j \le n$$

$$\bar{u}_{ij} = \frac{1}{4} \sum_{o=a}^{d} \left(\frac{\breve{u}_{ij}^{o}}{\breve{u}_{ij}^{o} + \hat{v}_{ij}} \right) \quad 1 \le i,\ j \le n$$

$$\hat{X} = [\hat{u}_{ij}]_{n \times n}$$

Step 8: Calculate the influence degree and influence degree of each factor.

$$q_i = \sum_{j=1}^{n} t_{ij} \quad i = 1, n$$

$$e_i = \sum_{j=1}^{n} t_{ij} \quad i = 1, \cdot n$$

Step 9: Calculate the centrality and cause of each factor.

$$\alpha = q + e \quad i = 1, \cdots, n$$

$$\beta^{i} = q^{i} - e^{i} \quad i = 1, \cdots, n$$

3.3 Empirical Analysis Process

Ten middle- and high-level managers evaluated the relationship between the factors affecting the logistics capabilities of food manufacturing enterprises. Because the knowledge background and practical experience of the experts were similar, the weight vector of each expert evaluation was determined to be W=0.1.

The expert intuition score set constructed by the expert's determination of the degree of influence between the factors on the maximum and minimum possible impact.

The nine-level language evaluation set (Table 1) in which R is transformed according to the trapezoidal fuzzy number is obtained as an expert score fuzzy processing set.

The expert score fuzzy processing set is combined with the trapezoidal intuitionistic fuzzy number algorithm and the weight vector of the expert group to obtain the direct relationship influence matrix $\hat{X}$ of the expert group.

The membership function normalization parameter $\lambda_u = 0.0619$ and the non-membership function normalization parameter $\lambda_v = 0.3582$ are calculated.

The direct relationship influence matrix $\hat{X}$ of the expert group is standardized and converted into a comprehensive relational fuzzy influence matrix $\breve{X}$.

Table 2 is calculated after calculating the matrix of each non-affiliation score function in $\breve{X}$.

Deblurring $\breve{X}$ to get the comprehensive relationship of each factor affects matrix $\hat{X}$ is shown in Table 3.

Calculate the degree of influence and the degree of influence of each factor of $\hat{X}$, and obtain the centrality and cause (see Table 4).

Table 2 Score function matrix of non-membership degree of each factor

Factors	F1	F2	F3	F4	F5	F6
F1	0.771	0.703	0.292	0.334	0.526	0.308
F2	0.520	0.645	0.192	0.265	0.197	0.439
F3	0.566	0.356	0.549	0.523	0.208	0.530
F4	0.019	0.020	0.007	0.462	0.068	0.399
F5	0.136	0.136	0.047	0.435	0.513	0.314
F6	0.030	0.029	0.010	0.045	0.103	0.433

Table 3 Influence matrix of comprehensive relation of each factor number

Factors	F1	F2	F3	F4	F5	F6
F1	0.020	0.022	0.069	0.110	0.020	0.074
F2	0.053	0.046	0.135	0.087	0.181	0.148
F3	0.043	0.093	0.051	0.044	0.173	0.136
F4	0.242	0.242	0.244	0.064	0.198	0.155
F5	0.113	0.151	0.217	0.051	0.042	0.164
F6	0.235	0.236	0.245	0.227	0.171	0.109

Table 4 Factors of influence, degree of influence, centrality and cause

Code	Factor	Influence degree	Sort	Affected degree	Sort
F1	Food quality assurance	0.315	6	0.706	5
F2	Flexible	0.650	4	0.790	2
F3	Innovation capacity	0.539	5	0.962	1
F4	Logistics system information level	1.145	2	0.582	6
F5	Food standard	0.739	3	0.785	4
F6	Consumer demand	1.222	1	0.787	3
Code	Factor	Center degree	Sort	Reason	Sort
F1	Food quality assurance	1.021	6	-0.391	5
F2	Flexible	1.440	5	-0.139	4
F3	Innovation capacity	1.501	4	-0.423	6
F4	Logistics system information level	1.728	2	0.563	1
F5	Food standard	1.524	3	-0.046	3
F6	Consumer demand	2.009	1	0.435	2

3.4 Empirical Analysis Results

3.4.1 Centrality and cause

Through the comprehensive impact relationship matrix analysis, the factors affecting the logistics capacity of the food manufacturing industry (the factors with a centrality greater than zero) can be derived from the consumer demand (F6) and the logistics system informationization degree (F5),food standard (F4), innovation ability (F3), flexibility (F2), food quality assurance (F1). Explain that consumer demand (F6) is the most important in the system, and food quality assurance (F1) is the least important in the system.

From the perspective of reason, in addition to the consumer demand and the degree of informationization of the logistics system, the other influencing factors are negative causes. This means that in terms of logistics capability, food quality assurance, flexibility, innovation ability and food standards do not affect other factors, but they can represent the strength of logistics capability.

3.4.2 Influence degree and influenced degree

Consumer demand (F6) has the highest impact, and innovation ability (F3) has the highest impacted, indicating that consumer demand (F6) is the most likely to affect other factors within the system. Innovation ability (F3) is the easiest to be factored in by other factors within the system affected. The food quality assurance (F1) and innovation ability (F3) are relatively independent factors. These factors have little impact on other factors and the degree of impacted, and do not occupy a central position among the factors affecting logistics capacity.

3.4.3 Comprehensive analysis

In general, consumer demand (F6) has the highest degree of centrality, the highest degree of influence, the higher degree of influenced, and the general factor of cause degree. This factor has a great influence on other factors, and the other factors also have a great influence on this factor. This indicates that among the influencing factors of logistics ability, whether each factor can promote the logistics ability can be measured by observing whether the market of food manufacturing industry has strong consumer demand. The informationization degree of logistics system (F4) is the factor with the highest degree of cause, higher degree of influence and center degree, and the lowest degree of influenced, which indicates that the level of logistics ability directly affects food quality assurance, flexibility, innovation ability and other factors.

The centrality, cause, influence and impact of flexibility (F2) and food standard (F5) are moderate, which means that flexibility and food standards have certain influence on other factors and are also affected by other factors. However, the degree of influence is at a medium level between consumer demand, the degree of informatization of the logistics system, and the assurance and innovation ability of food quality.

4. CONCLUSION

This study constructs the conceptual model and system framework of the factors that affect the logistics capacity of food manufacturing enterprises, and further divides the influencing factors into two components of the specific internal influence factors and external influence factors. On the basis of the influencing factors conceptual model and system framework, DEMATEL method based on trapezoidal intuitionistic fuzzy number is used for carrying out empirical analysis and evaluation of the influencing factors of logistics capability of food manufacturing enterprises, internal influencing factors include food quality assurance ability, flexibility, innovation ability, information level of logistics system, external factors include food standards and consumer demand. The research provides theoretical reference and practical guidance for further rational identification and enhancement of logistics capabilities of food manufacturing enterprises.

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REFERENCES

[1]Zhang Qi, Liu Renjing, Yang Jingyu, “Analysis of factors influencing knowledge transfer performance”, Science of Science Research, Vol.37, No.02, pp.311-319, 2019.

[2]Zhou Xiaohui, Yao Jian, Wu Tiankui, “TOPSIS multi-attribute decision making method based on trapezoidal intuitional fuzzy number”, Journal of Shanghai University of Science and Technology, No.03, pp.20-48, 2014.

[3]Zhang Qi, Liu Renjing, Xu Qingchuan, “Improved DEMATEL method based on trapezoidal intuitive fuzzy number”, Industrial Engineering and Management, No.3, 2019.

[4]J. Wu, Y. Liu, “An approach for multiple attribute group decision making problems with interval valued intuitionistic trapezoidal fuzzy numbers”, Computers & Industrial Engineering, Vol.66, No.2, pp.311-324, 2013.

[5]K .Govindan, R .Khodaverdi, A. Vafadarnikjoo, “Intuitionistic fuzzy based DEMATEL method for developing green practices and performances in a green supply chain”, Expert System with Applications, Vol.42, No.20, pp.7207-7220, 2015.

[6]F. Herrera, E. Herrera-Viedma, L. Martinez, “A fusion approach for managing multi-granularity linguistic term sets in decision making”, Fuzzy Sets & Systems, Vol.114, No.1, pp.43-58, 2000.

[7]Wang Yiran, Liu Xuying, “Study on the influence of internal control quality on enterprise performance”, Shanxi Agricultural Economics, No.12, pp.80, 2018.

[8]Dai Ying, Shi Yun, Song Han, “Research on benefit distribution mechanism of electronic product logistics service integrated supply chain cooperation”, Computer Application Research, Vol.33, No.4,

pp.1077-1095, 2016.
[9]Zhang Huan, "Influence of four factors on logistics capability of enterprises", Market BBS, No.7, pp.42-46, 2015.
[10]Liu Xingyu, "Research on supply chain logistics capability and development trend", Modern Economic Information, No.1, pp.54, 2016.
[11]Liu Wei, "Empirical study on the impact of logistics capability of manufacturing enterprises on supply chain integration", Master's Thesis of Chongqing University, 2014.
[12]Qin Chao, Liu Qiming, "Composition and evaluation of circulating cargo flow capacity of automobile manufacturers", Logistics Technology, No.11, pp.7-10, 2015.
[13]Zhang Qin, "Research on the relationship between green supply chain management and enterprise performance of Chinese pharmaceutical enterprises-the intermediary role of logistics capability", Master's Thesis of Anhui University, 2018.
[14]Lou Huibin, "Layout planning of distribution center of a food processing plant based on FLEXSIM simulation", Master's Thesis of Tianjin University of Technology, 2018.
[15]Xie Jing, "Study on cost control of food enterprises from the perspective of value chain", Master's Thesis of Chongqing University of Technology, 2018.
[16]Huang Yue, "Development status and countermeasures of food cold chain logistics in Ningbo", Modern Commercial Industry, Vol.39, No.07, pp.37-39, 2018.
[17]Yang Yihang, "Research on the impact of multi-layer logistics resources on the linkage efficiency of manufacturing and logistics industry", Doctoral Dissertation of Beijing Jiaotong University, 2017.

Empirical evaluation of innovation capability of equipment manufacturing enterprises based on cloud model

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Abstract: The innovation ability is the key factor of sustainable development of equipment manufacturing enterprises, the evaluation index of effective innovation ability, and the effective method of evaluation model and method of effective innovation ability are the effective ways and important foundation for enhancing and strengthening the innovation ability of equipment manufacturing enterprises. Based on the theory of enterprise innovation ability and the theory of cloud model, we set up four dimensions enterprise of resource input capacity, internal management capacity, innovative output capacity, innovation external environment, and select corresponding evaluation index, and construct the evaluation index system of innovation ability of equipment manufacturing enterprises. On the basis of evaluation index system, data collection is collected, the method cloud model is selected, and the innovation ability of equipment manufacturing enterprise is evaluated by the advantage of the cloud model method, and the innovation ability level of the equipment manufacturing enterprise is empirically evaluated. The empirical results provide effective theoretical guidance and guidance for improving the innovation ability of equipment manufacturers.
Keywords: Equipment manufacturing enterprise; Innovation ability evaluation; Cloud model

1. INTRODUCTION

The improvement and improvement of the innovation ability of the equipment manufacturing enterprise is the key means and tools for the enterprises to continuously enhance their competitiveness, vitality and technological progress. The evaluation index of effective innovation ability, using the effective innovation ability evaluation model and method has become the main competition point and key point of control for upgrading the equipment manufacturing enterprise's innovation ability, it is very important to evaluate the innovation ability of the equipment manufacturing enterprise, which is beneficial to the innovation ability of the equipment manufacturing enterprise, so that the equipment manufacturing enterprise's innovation ability enters the virtuous circle. Scholars at home and abroad have made a systematic and in-depth study on the innovation ability of the equipment manufacturing enterprises, and have made a breakthrough in this field, which provides a theoretical basis and a practical framework for further research on the related content of equipment manufacturing enterprises' innovation ability. However, there is a lack of evaluation index system for the innovation ability of the equipment manufacturing enterprises with the unification and system. The results of the empirical analysis of the innovation ability of the equipment manufacturing enterprises are lacking, and the literature on the innovation ability of the equipment manufacturing enterprises is relatively few. In view of this, this paper draws on the theory of enterprise innovation ability and the theory of cloud model, the research target of equipment manufacturing enterprises, the research object of equipment manufacturing enterprises as the research object, and the evaluation index of dimension and dimension, the evaluation index system of the innovation ability of the equipment manufacturing enterprise, and the principle and advantages of the cloud model, and the innovation ability of the equipment manufacturing enterprise. The research is to provide theoretical basis for scholars to further study the related content and issues of the innovation ability of equipment manufacturing enterprises, and provide the empirical analysis result and practice basis for the further enhancement and continuous improvement of the equipment manufacturing enterprises' innovation ability.

2. EVALUATION INDEX SYSTEM OF INNOVATION ABILITY OF EQUIPMENT MANUFACTURING ENTERPRISES

The goal of the evaluation index system of the equipment manufacturing enterprise is to adopt the standard evaluation index selection principle to carry out the index selection, to determine the indexes of the evaluation index of the equipment manufacturing enterprise, and to construct the evaluation index system according to the index of the selected index and the evaluation index system established.

The establishment of the evaluation index system of the equipment manufacturing enterprise and the selection principle of the evaluation index include: the principles of systematic principle, index measurable principle, index and target relevance principle, the principle of combining quantitative and qualitative

criteria, the principle of combining absolute and relative indices.

The establishment of the evaluation index system of the equipment manufacturing enterprise is the process of combining the dimension with the index. Reference and reference literature [1-22], based on the present situation of the development of equipment manufacturing enterprises, the present situation of innovation capability and the existing problems, the evaluation index system of enterprise innovation ability is divided into four representative dimension spaces, which represent the ability of resources successively to be put into the innovation process (enterprise resource input ability), the ability of the enterprise to manage the innovation activities (internal management ability), the technology or product output of the enterprise innovation activities (the ability to innovate) and the external environment (innovation externa).

On the basis of the four dimensions of enterprise resource input capacity, internal management capacity, innovative output capacity, and innovation external environment, this study refers to relevant literature and references[1-22], sets corresponding evaluation index of each dimension, innovation ability evaluation index system of equipment manufacturing enterprise is shown in table 1

Table 1 Innovation ability evaluation index system of equipment manufacturing enterprise

Enterprise innovation ability	Enterprise resource input ability	The evaluation of the capacity of R&D funds
		The evaluation of the capacity of non-R&D funds
		The proportion of R&D personnel
		Thenet worth of research and development of research and development
		The training intensity of R&D personnel
		The education level of the core R&D staff
	Internal management ability	The investment in information management
		The innovation culture and innovation atmosphere
		The organizational communication and coordination capacity
	The ability to innovate	The share of new product sales
		Patent and proprietary technology ownership
		Total net profit margin
	Innovation external	Local government support
		Marketization degree
		Regional financial development level
		Degree of cooperation with external organizations

3. EMPIRICAL ANALYSIS OF THE EVALUATION OF INNOVATION CAPABILITIES OF EQUIPMENT MANUFACTURING ENTERPRISES BASED ON CLOUD MODELS

3.1 Sample Selection and Data Collection

3.1.1 Questionnaire design

Based on the sixteen evaluation indexes identified above, the evaluation indexes are described, and the description of the problems follows the principles of simple and easy to understand. In the process of designing the design, the commonly used Likert seven-point scale was used, which was highly unsatisfied with the evaluation attitude, and then rated the evaluation index.

The design of the questionnaire is divided into two parts, the first part is the questionnaire, the survey content, the research significance and so on, thus weakens the apprehension of the visitor. The second part is the text of the questionnaire, the main contents of the questionnaire, and the evaluation of the capacity of R&D funds, the evaluation of the capacity of non-R&D funds, the proportion of R&D personnel, the training intensity of R&D personnel, the net worth of research and development of research and development, the education level of the core R&D staff, the investment in information management, the innovation culture and innovation atmosphere, the organizational communication and coordination capacity, the share of new product sales, patent and proprietary technology ownership, total net profit margin, local government support, marketization degree, regional financial development level and degree of cooperation with external organizations.

3.1.2 Survey method

3.1.2.1 Copy research

The copywriting method is a way of investigating the content of the data that is available to the company. In the market, the investigators have collected, sorted and summarized the second-hand data, which can help the enterprises to know the relevant information quickly, and also help the high-level to have a preliminary understanding of the market conditions to enter and lay the foundation for further investigation.

Collect all available information on 10 equipment manufacturing companies, including internal and external data. The internal data of the enterprise includes the business data such as the purchase order, the statistical data such as various statistical reports and other information such as the daily briefing. The external information is provided by the industry association of the manufacturing industry, such as market information, trade fairs and exhibitions, and

other information provided by the internet.

3.1.2.2 Deep interview method

The deep interview method is a kind of unstructured, direct one-to-one access, in the investigation, needs to have a comprehensive depth analysis, understanding, and hope to discover some important circumstance through the visit. In this interview, the interview technique of step forward, hidden problem searching and symbolic analysis is conducted, and interviews with experts are conducted to obtain relevant information from the experts so that the questionnaire can be modified so that the feedback after the questionnaire is more valuable. After the interview, the questionnaire was modified.

3.1.2.3 Network investigation

The method of network investigation is to collect, record, collate, analyze and publish the information of net citizen's feedback on the internet. It is the application and development of traditional investigation methods on the internet, through internet, computer communication and digital interactive media, the survey method of collecting information according to the E-mail address of the respondent. The network investigation has the self-willingness, directionality, timeliness, interactivity, economy and anonymity.

The survey uses internet survey method to put the questionnaire on the network platform, the questionnaire is provided to the respondent via the internet, the network questionnaire is distributed, filling, submitting, collecting the boundary of time and space, and also reducing some unnecessary trouble.

3.1.3 Advance survey

According to the purpose of this survey and the content of the study, the first draft of the questionnaire was submitted to the senior management of the target enterprise for evaluation, and the questions that were not related to the study were excluded and the questions were revised. The senior management in the related enterprises are both master and above, and the working life of the enterprise is 5-10 years. After the questionnaire was modified, a small sample was used for the preliminary investigation. The statistical rule is that the sample size is less than 30, so the sample size of the sample is 10, and the equipment manufacturing enterprise is divided by the size of the enterprise, the number of employees below 2000 is 1, and above 2000 is 2.The survey was conducted in a field survey, which was then recycled and analyzed for the collected questionnaire.

3.1.4 Formal investigation

The results of the survey are better, so a formal investigation is under way. The formal questionnaire used the revised questionnaire, and the formal questionnaire was given to the appendix. The survey uses random sampling to select 10 representative and typical equipment manufacturing enterprises in the eastern region. The formal investigation mainly involves in-depth interviews, field interviews and field questionnaires, which are used to carry out questionnaires to the middle and senior managers of various equipment manufacturers in the eastern region, and the data can be used to meet the needs of the research.

3.2 Empirical Analysis Method

3.2.1 The main principles of the cloud model

Y is a quantitative area of a series of functions, and set Z to represent the qualitative aspect of a quantitative area. If x is randomly assigned by Z, x has a certain bias in the certainty of the qualitative value Z, then the distribution of x in the quantitative domain Y is the cloud, where every x becomes a cloud droplet. In the cloud model, some quantitative indicators are used to represent the meaning of the cloud, which means that the cloud also has its own unique concept of digital, and in this respect, as far as possible, represents the holistic, holistic nature of the cloud. There are three main indicators: expectation (E_x), entropy (E_n), and superentropy (H_n).These three numbers give a full overview of the cloud. The three numbers are explained: the expectation is that the expected value is the central value of the cloud droplets in the region, and is the most representative; the entropy is influenced by the randomness and fuzziness of the qualitative concept, and the decision is made, which also reflects the dispersion degree of the cloud droplets, and the entropy value also maximizes the marginal maximization of the qualitative concept, and reflects the range of values that cloud droplets are seeking in this area. This is the degree of ambiguity that comes with the quantization of the qualitative concept, and it is calculated again. Under normal circumstances, the higher the entropy value, the greater the acceptable range of cloud droplets, the stronger the fuzziness of the concept; the superentropy is the uncertainty of entropy and the corresponding transformation, which reveals the uncertainty, cohesiveness and closeness of the qualitative concepts in the region’s linguistic value points, and the thickness of the cloud is shown on the side [1-5].

3.2.2 The main advantages of the cloud model

In the cloud model, the qualitative concept of using language value can be used to transform the qualitative concept, which is to say that the qualitative and quantitative variables can be changed without losing information in the process of establishing the cloud model, and the result shows that there is some special relation between the randomness and the fuzziness of the qualitative concept. Using the cloud model to evaluate the innovation ability of enterprises, using the three kinds of digital characteristics, especially the expected value, can show the level of enterprise innovation ability and the present situation of the enterprise in this field [1-5].

3.2.3 The main modeling steps for thecloud model

The main modeling steps for the cloud model are shown below [1-5]:

3.2.3.1 Set up an evaluation index system

The evaluation system of the innovation ability of the equipment manufacturing enterprise can be drawn by the four index dimensions and the 16 hard and small indexes that are included in the previous selection, as shown in figure 1.

$R = \{R_1, R_2 \cdots R_n\}$, $R_i (i \in [1, n])$ among them is the first index of the system..

$R_i = \{R_{i1}, R_{i2}, \cdots R_{im}\}$, $R_{ij}(j \in [1, m])$ among them is the jth indicator of R_{ij} .By analogy, the hierarchy of evaluation metrics is determined, as shown in figure 1.

3.2.3.2. Cloud model of qualitative comment set

As a group of seven quality reviews, V= {very unsatisfied, unsatisfied, less satisfied, generally, more satisfied, satisfied, very satisfied}, because of the more qualitative comments, the use of bilateral constraint method to represent the cloud. Suppose a qualitative comment's bilateral constraint is expressed by $[V_{\min}, V_{\max}]$, using the following formula (1) (2) to calculate the numerical characteristics of qualitative comments in the cloud:

$$E_x = (V_{\min} + V_{\max})/2 \quad (1)$$

$$E_n = (V_{\max} - V_{\min})/6 \quad (2)$$

The five comments in the middle are described using the symmetric cloud model, the expected value and the entropy value are calculated according to (1) and (2), and the evaluation of the two ends is described by a semi-cloud model with a lack of critical value at one end, and two comments on total disagreement and complete agreement are set as 0 and 1, and the corresponding entropy value is 1/2 of the entropy of the other comment cloud model. The area of the review set specified in the annotation set is zero, one for each interval, and the corresponding expectations and entropy are shown in table 2.

Table 2 Description of each qualitative comment (Cloud model)

Comment	Very unsatisfied	Unsatisfied	Less satisfied	Generally	More satisfied	Satisfied	Very satisfied
Zone	(0,0.143]	(0.143, 0.286]	(0.286, 0.429]	(0.429, 0.572]	(0.572, 0.715]	(0.715, 0.858]	(0.858, 1]
Expected	0	0.215	0.358	0.501	0.644	0.787	1
value							
Entropy	0.0119	0.0238	0.0238	0.0238	0.0238	0.0238	0.0119
Super Entropy	0.005	0.005	0.005	0.005	0.005	0.005	0.005

3.2.3.3. Senior management evaluation in the organization

The evaluation indexes are evaluated by the senior managers in the number of t enterprise, the corresponding qualitative comments are established, and the corresponding evaluation is made according to the evaluation results.

3.2.3.4. Quantitative conversion of qualitative comments

According to the qualitative evaluation in table 3, the corresponding expected value and entropy value, the expert's qualitative comments are collected and transformed into a decision matrix D consisting only of expected values, and the formula for the cloud parameters of the one-dimensional cloud model is as follows:

Expected value:

$$E_x = \frac{E_{x1}E_{n1} + E_{x2}E_{n2} + \cdots + E_{xt}E_{nt}}{E_{n1} + E_{n2} + \cdots + E_{nt}} \quad (3)$$

Entropy:

$$E_n = E_{n1} + E_{n2} + \cdots + E_{nt} \quad (4)$$

3.2.3.5. Multilayered cloud representation

In the light of the multilevel evaluation index system of this paper, we can calculate the expected value and entropy value of each evaluation index, and then calculate the expected value and entropy, and finally calculate the expected value of the whole evaluation index system. Assuming that there are n adjacent cloud models in the index system, the formula (5) and (6) are used to obtain the expected values and entropy values for the integrated cloud model:

$$E_{xY} = \frac{E_{x1}E_{n1}W_1 + E_{x2}E_{n2}W_2 + \cdots + E_{xn}E_{nn}W_n}{E_{n1}W_1 + E_{n2}W_2 + \cdots + E_{nn}W_n} \quad (5)$$

$$E_{nY} = E_{n1}W_1 n + E_{n2}W_2 n + \cdots + E_{nn}W_n n \quad (6)$$

The cloud parameters corresponding to n neighboring cloud models are $E_{x1}, \cdots, E_{xn}$ and $E_{x1}, \cdots, E_{xn}$, $W_1, \cdots, W_n$ are the weights of each index, and n is the number of indices.

The integrated cloud is the idea of integrating n neighboring concepts into a certain concept, resulting in a higher level of parent cloud. According to the formula (5) and (6) can be calculated from the bottom to the top, the expected value and entropy value of each index cloud model in the evaluation index system are obtained.

3.2.3.6. Analytical evaluation results

3.3 Empirical Analysis Process

3.3.1. Senior management in the enterprise gives an evaluation. Based on the information collected from the questionnaire, 10 of the valid samples were extracted, and the indexes in the system of innovation ability of the equipment manufacturing enterprise were evaluated.

3.3.2. Qualitative comments are quantified using cloud models. Refer to table 1 for the transformation of each of the indicators in table 2 to get the matrix D from the expected value. Using the formula (3) and (4), we can

calculate the one-dimensional cloud model of the equipment manufacturing enterprise's innovation ability evaluation index. For example, the expected value of the cloud model R_{11} (R&D funding rate) is:

$$E_{xR11}=\frac{0.644*0.0238+0.787*0.0238+0.358*0.0238+0.644*0.0238+\cdots+0.787*0.0238}{0.0238+0.0238+0.0238+0.0238+0.0119+0.0238+0.0238+0.0238+0.0238+0.0238}=0.633$$

$$E_{nR11}=0.0238+0.0238+0.0238+0.0238+0.0119+0.0238+0.0238+0.0238+0.0238+0.0238=0.2261$$

$$D=\begin{pmatrix}
0.644 & 0.787 & 0.787 & 0.787 & 0.644 & 0.787 & 0.644 & 1 & 0.787 & 1 & 1 & 1 & 0.787 & 0.787 & 0.787 & 1 \\
0.787 & 0.644 & 0.787 & 0.644 & 1 & 0.644 & 1 & 0.644 & 0.644 & 0.787 & 0.787 & 0.787 & 0.644 & 0.644 & 1 & 0.644 \\
0.358 & 1 & 0.787 & 0.644 & 0.787 & 1 & 0.787 & 0.644 & 1 & 0.644 & 0.644 & 0.644 & 0.358 & 1 & 0.644 & 0.787 \\
0.644 & 0.787 & 0.787 & 1 & 0.644 & 0.644 & 0.787 & 0.644 & 0.787 & 1 & 0.358 & 0.358 & 1 & 0.358 & 0.358 & 0.644 \\
1 & 0.644 & 0.787 & 0.215 & 0.358 & 0.787 & 1 & 1 & 0.644 & 0.644 & 1 & 1 & 0.644 & 0.644 & 1 & 0.787 \\
0.644 & 0.358 & 0.787 & 0.644 & 0.787 & 1 & 0.787 & 0.787 & 1 & 0.787 & 0.644 & 0.787 & 0.644 & 1 & 0.787 & 1 \\
0.787 & 0.644 & 0.644 & 0.787 & 0.644 & 1 & 0.787 & 0.787 & 0.644 & 0.787 & 0.787 & 0.644 & 0.644 & 0.787 & 0.644 & 0.787 \\
0.215 & 0 & 0.644 & 0.358 & 1 & 0.644 & 0.644 & 0.787 & 0.787 & 1 & 0.358 & 0.787 & 0.787 & 0.644 & 1 & 0.644 \\
0.644 & 0.644 & 0.644 & 1 & 0.787 & 1 & 1 & 1 & 0.787 & 0.215 & 0.644 & 1 & 1 & 0.787 & 0.787 & 1 \\
0.787 & 0.215 & 0.787 & 0.787 & 0.215 & 0.644 & 1 & 0.644 & 0.644 & 0.644 & 0.787 & 0.787 & 0.787 & 0.787 & 0.787 & 0.644
\end{pmatrix}$$

In the same way, you can find the expected value and entropy values of the other 15 evaluation metrics, as shown in table 3.

Table 3 Expected value and entropy values of evaluation metrics

Index	R11	R12	R13	R14	R15	R16	R21	R22	R23	R31	R32	R33	R41	R42	R43	R44
Expected value	0.633	0.58	0.7444	0.652	0.652	0.769	0.805	0.757	0.747	0.707	0.668	0.74	0.61	0.715	0.74	0.757
Entropy	0.22161	0.21142	0.2238	0.21142	0.21142	0.19104	0.19104	0.20223	0.21142	0.20223	0.21142	0.20223	0.22161	0.21142	0.20223	0.20223

3.3.3. Multilevel integrated cloud analysis. For the evaluation index system of the equipment manufacturing enterprise's innovation ability, several neighboring cloud models are synthesized according to the formula (5) and (6), and the higher level of the parent cloud is obtained. First, the index should be allocated appropriately, and the weights are determined by the experts' scores, and the weights are determined according to the proportion of the average, and the weight is shown in Table 4.

Based on the weights given and combined with the formula (5) and (6), the expected value and entropy of the first layer of the evaluation index system can be obtained in Table 5.

Finally, the expected value of the target layer equipment manufacturing enterprise's innovation capability cloud model is 0.709.

Table 4 Weight of evaluation index

Primary index	Weight	Secondary index	Weight
R1	0.355	R11	0.158
		R12	0.142
		R13	0.18
		R14	0.165
		R15	0.165
		R16	0.19
R2	0.201	R21	0.346
		R22	0.33
		R23	0.324
R3	0.188	R31	0.335
		R32	0.317
		R33	0.348
R4	0.256	R41	0.241
		R42	0.246
		R43	0.254
		R44	0.259

Table 5 Equipment manufacturing enterprise innovation ability expected value and entropy values of evaluation metrics

Index	Enterprise resource input ability	Internal management ability	The ability to innovate	Innovation external
Expected value	0.678	0.77	0.706	0.707
Entropy	0.216	0.202	0.206	0.211

3.4 Empirical Results

3.4.1. According to the whole empirical analysis process, the first part gives each index to the equipment manufacturing enterprise's innovation ability cloud model and the innovation ability each index gives each the weight, and at the end carries on the weighted computation, when the weight of each evaluation index

is given, uses 10 managers to rate the 16 evaluation indexes, and then calculates the average of 10 managers to each evaluation index respectively,

$$E_1 = 5, E_2 = 4.5, E_3 = 5.7, E_4 = 5.2, E_5 = 5.2,$$
$$E_6 = 6, E_7 = 6.2, E_8 = 5.9, E_9 = 5.8, E_{10} = 5.6,$$
$$E_{11} = 5.3, E_{12} = 5.8, E_{13} = 5.5, E_{14} = 5.6,$$
$$E_{15} = 5.8, E_{16} = 5.9$$

using the mean value of each index to calculate the weight of each index, and using the ratio of the second order index as the weight of the secondary index, and using the ratio of the first order index as the weight of the primary index, we set up a one-dimensional cloud model, calculate the expected value of each index and the entropy value, and calculate the expected value and the entropy value of each index in the cloud model by the expected value of each index and the weight given by each index respectively,

$$E_{xR11} = 0.633, E_{xR12} = 0.58, E_{xR13} = 0.744, E_{xR14} = 0.652, E_{xR15} = 0.652, E_{xR16} = 0.769, E_{xR21} = 0.805, E_{xR22} = 0.757, E_{xR23} = 0.747, E_{xR31} = 0.707, E_{xR32} = 0.747, E_{xR33} = 0.714, E_{xR41} = 0.61$$
$$E_{xR42} = 0.715, E_{xR43} = 0.74, E_{xR44} = 0.757,$$

after the expected value in the cloud model of each indicator, the expected value of the cloud model is calculated according to the formula $E_{xR1} = 0.678, E_{xR2} = 0.769, E_{\mathrm{xR3}} = 0.706, E_{xR4} = 0.707$, based on the results, the expected value of the cloud model for innovation capability of the target layer enterprise is 0.709.

3.4.2. The second part of the paper shows that the innovation ability of the equipment manufacturing enterprise is higher, and the enterprise can improve the ability of internal management and innovation output, and improve the environment of innovation, so as to improve the innovation ability of the enterprise, and continue to strive for the higher level.

4. CONCLUSION

Based on the theory of enterprise innovation ability and the theory of cloud model, this study sets up four dimensions of enterprise resource input capacity, internal management capacity, innovative output capacity, innovation external environment, and selects corresponding evaluation index, and further constructs the evaluation index system of innovation ability of equipment manufacturing enterprises. With the help of evaluation index system, data collection is collected, the method cloud model is selected, and the innovation ability of equipment manufacturing enterprise is evaluated by the advantage of the cloud model method, and the innovation ability level of the equipment manufacturing enterprise is empirically evaluated. The empirical results provide effective theoretical guidance and guidance for improving the innovation ability of equipment manufacturers.

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REFERENCES

[1]Liu Jibing, Wang Dingchao, "Innovation ability and performance evaluation of small and micro enterprises based on analytic hierarchy process," Science and Technology Progress and Countermeasures, Vol.30, No.18, pp.165-169, 2013.

[2]Wu Hui, Wang Daoping, Zhang Qian, Zhang Zhidong, "The evaluation and comparative study of international cruise port competitiveness based on the cloud model," Chinese Soft Science, No.2, pp.166-174, 2015.

[3]Tang Jianrong, Wu Minghua, "Overseas returnees and enterprise innovation capability research-Based on FsQCA's empirical analysis," Management Modernization, No.2, pp.98-101, 2019.

[4]Feng Qiaojun, "Innovation ability evaluation of equipment manufacturing of Liaoning province," Northeastern University, 2014.

[5]Shu Fuhua, "The application of the cloud model in the evaluation of the production status of stone material," Stone Material, No.2, pp.30-35, 2017.

[6]Jiang Xianchen, "Empirical study on the evaluation of technological innovation ability in Liaoning province," Shenyang Normal University, 2013.

[7]Yan Danyang, "Innovation ability evaluation research of equipment manufacturing enterprises of Heilongjiang Province," Harbin Engineering University, 2015.

[8]Han Bing, "Research on technological innovation ability of Liaoning equipment manufacturing industry," Dalian University of Technology, 2009.

[9]Zhao Dan, Sun Bing, Yi Yingxin, "Equipment manufacturing industry's independent innovation capability evaluation based on the DEA-Malmquist method," Journal of He Hai university (Philosophical Social Sciences), Vol.20, No.2, pp.77-82+92, 2018.

[10]Wang Qi, "Independent innovation capability research of equipment manufacturing of Liaoning province," Liaoning University of Engineering and Technology, 2014.

[11]Luo Xiaoxiao, "Equipment manufacturing enterprise's independent innovation capability research of Heilongjiang province," Harbin Engineering University, 2010.

[12]Wu lei, "Equipment manufacturing enterprise's independent innovation capability research of Heilongjiang province," Harbin Engineering University, 2010.

[13]Lu Liangsheng, Li Yuan, Shi Xiaojing, "Research on enterprise innovation capability," Chinese Market, No.4, 2019.

[14]Zhao Yan, Han Xiao, and Li Zheng, "The innovative ability of faction and contact enterprises," Scientific Research Management, Vol.40, No.1, pp.61-75, 2019.

[15]Zhong Xueli, "The mechanism of enterprise innovation ability," Enterprise Technology and Development, No.12, pp.8-11, 2018.
[16]Jing Kun, Shao Yunfei, Tang Xiaowo, "Research on the impact of the network structure of the alliance on innovation ability of the alliance," Research and Development Management, Vol.30, No.6, pp.47-58, 2018.
[17]Huang Lucheng, Chen Xiao, Yang Zaoli, "Innovation ability research of Beijing high technology enterprises," Chinese Science and Technology Forum, No.1, pp.89-99, 2019.
[18]Sun Qian, Liu Jie, Zhang Ruimeng, "The relationships between institutional transaction cost and enterprise innovation ability," Journal of Sinopec Management Institute,Vol.20, No.06, pp.55-58, 2018.
[19]Zhang Jinglei, "Power mechanism, operation mechanism and innovation ability of state-owned enterprises," Modern State-owned Enterprises Research, No.22, 2018.
[20]Su Yi, Yu Yueqi, Li Dan, "The impact of enterprise innovation ability on sustainable development ability-Based on the adjustment of government subsidies," Economic Management of East China, Vol.32, No.11, pp.112-117, 2018.
[21]Kang Yankun, Mao Yu, Liu Ruiming, "What is the poor quality of Chinese enterprises' independent innovation ability?-A review of the literature on innovation policy perspectives," Institutional Economics Research, No.3, pp.171-195, 2018.
[22]Zhong Wei, Wang Shumei, Peng Yongmei, "Research on equipment manufacturing technology innovation ability evaluation index system construction," Operations and Management, No.9, pp.74-77, 2018.

Application Analysis on Forest Fire Pre-warning Model in Power Grid Based on Iterative Algorithm

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Abstract: Aimed at the impact of forest fire on the operation of the power system, this paper proposes a forest fire warning model based on Wang zhengfei forest fire prediction model and mainly calculated by iterative algorithm. Moreover, its application in the power system is analyzed. This model can precisely forecast forest fire before it occurs or at the early stage. As a result, the impacts of forest fire on power system could be well controlled. Finally, a case is introduced to test the validation of the forest fire pre-warning model.
Keywords: forest fire; pre-warning; iterative algorithm; power grid

1. INTRODUCTION

At present, with the increasing number of transmission lines, the forest fires have already given rise to a significant impact on the transmission lines in many forest areas, which in turn influence the stability of the power system. First, due to the forest terrain, the transmission line with voltage level of 220kV and above are generally constructed by the same tower. If the forest fire suddenly occurs, the multiple return transmission lines will trip at the same time, which causing the power supply to be interrupted. Secondly, the fault of such a trip is a permanent failure to the transmission line. Generally, if the restart fails, there will be severe consequences such as a long-term outage of the line and insufficient power supply [1]. In order to prevent the safety problem and the social impact on transmission line caused by forest, it is of great significance to study the forest fire pre-warning model on the power system.

As early as the last century, some European and American countries, such as the United States, Canada, Australia, etc., have begun to research and formed their research systems on forest fire disasters with characteristics. For the technology of wireless sensor networks, experts from the University of Washington conducted research on related fire source search by using mobile agents, which will transmit the field data, so as to ensure the accuracy of the data, as well as take up less storage space, but the security and power consumption of the technology requires further research. In terms of the using of artificial satellites, Canada and other countries have conducted research on forest fire monitoring and rescue missions and the results are gorgeous. Australia has led research on video surveillance of forest fire disasters and developed a "forest fire camera" that can determine the fire within 11km of it in time [4]. In China, the research on forest fire began to develop gradually in the 1950s. The Daxinganling Extraordinary Forest Fire happened on May 6, 1987 was a turning point. Daxinganling Regional Meteorological Bureau proposed and established a forest fire forecasting system [5], which using the multi-factor comprehensive indicator forest fire risk prediction method, basing on the comparison of historical fire sample data with the same period meteorological data, and introduces the concept of fuzzy set.

The forest fire pre-warning model on power system based on the iterative algorithm is proposed based on the physical model of forest fire propagation. It works according to the radiation mechanism, solving the spread speed and direction of the forest fire by iterative algorithm, and compared them with the actual situation. Then a more detailed pre-warning model of forest fire is obtained.

2. POWER GRID FOREST FIRE PRE-WARNING MODEL BASED ON ITERATIVE ALGORITHM

2.1 INTRODUCTION TO ITERATIVE ALGORITHMS

Due to the high-speed computing power and repetitive working ability of computers, the iterative algorithm is a more familiar kind of method to use when computing with computers. When the computer performs the steps, it starts from the original value of a variable and reckons the new value of this variable [6]. The iterative calculation is also divided into two cases, one situation is giving the times of iterations, so that the iterative calculation can conduct according to the given number and obtain the final result; the other situation is that no times iterations are given, but a specific condition is given (such as making a standard deviation value less than a very small number), when the condition is met, stop the iterative process and obtain the final result. When adopting an iterative algorithm, attention should be paid to the following aspects: the determination of iterative variables, the establishment of iterative formulas, and the control of iterative relationships. The control of the iterative relationship has been described above. The choice of iterative variables is very critical, which must be a variable and can be continuously

pushed to new values from old values through a relationship, which is an iterative relationship.

2.2 BASIC MODEL OF FOREST FIRE PRE-WARNING

The warning of the spread of forest fire refers to the warning that the transmission line may be damaged at a certain time and space within the circumstances of the occurrence of the forest fire. The role of the early warning model is to release the real-time threat signal that the forest fire may cause to the power grid. Ensure that personnel has enough time to take preventive measures to minimize the effects [7]. We have to arrange the entire forest during the monitoring in a fire forest fire. If we only consider the forest fire monitoring of the transmission line, only the forest area around the transmission line need to be considered because as far as transmission line operation is concerned, forest far away from transmission line will not affect the operation of the line, so early warning is not required. From the perspective of the entire forest, as long as a fire occurs, it is necessary to warn and take corresponding measures [8].

At present, among the forest fire pre-warning models proposed by researchers from domestic and foreign, the forest fire spread velocity model is generally equivalent to a heat transfer model, and the diffusion coefficient, temperature and thermal radiation coefficient are given. The main methods include the correction coefficient method and the correction factor method. Because the physical factors affecting the spread of forest fires are numerous and complex, simply considering one or several impact factors do not accurately describe the actual forest fire model. Therefore, it is necessary to comprehensively consider the effects of some major factors and establish a mountain fire warning model based on those major impact factors. There are two well-known physical models. One is the fire spread model of W.R.Fons, which introduces the influence of local wind speed and obtains the formula of the spread speed of the forest fire:

$$v = \frac{c_1(f_c + f_r)s}{\rho \ln \frac{c_2(T_i - T_a)}{T_f - T_i}} \quad (1)$$

The distance between the combustion beds composed of the same fuel particles s is calculated according to the discharge speed of the fuel particles, T_f is the temperature of the flame and fuel, T_a is the ambient temperature, T_i is the ignition temperature. According to the law of thermodynamics, c_1 and c_2 are related to wind speed, ρ is the density of combustibles.

Another model is proposed by Albini. The model considers that flame radiation is the main mechanism fuel that absorbs radiant heat and then undergoes pyrolysis. Consume thermodynamic thin combustion bed is composed of randomly distributed particles that appear to be black fuel from the radiance point of view. Using the radiant heat balance law between the burning zone and the unburned fuel to obtain a closed equation. Although the model is conceptually perfect to some extent, it still lacks actual verification. The critical way to predict the behavior of forest fires is to predict the real-time spread speed, the length of the fire line, the area of the fire field based on the forest fire spread model. The physical model of forest fire spread proposed in this paper is based on Wang Zhengfei forest fire spread model. The main factors are wind speed, types of combustibles, terrain slope and meteorological information. Using Rothermel model to combine physical parameters and physical variables, and the spread velocity formula is thus derived as shown in the following equation:

$$v = \frac{c_1(f_c + f_r)s}{\rho \ln \frac{c_2(T_i - T_a)}{T_f - T_i}}(1 + K_1 + K_2) \quad (2)$$

In the above formula, K_1 is the combustible material correction coefficient; K_2 is the slope correction coefficient, and the rest of the parameters are described in formula (1).

2.3 APPLICATION OF ITERATIVE ALGORITHM IN FOREST FIRE PRE-WARNING MODEL

The spread of forest fire refers to the phenomenal characteristics during the period from the moment that combustibles are ignited to the moment combustibles are extinguished. It is a kind of forest fire behavior. The forest fire spread model is a kind of relationship between forest fire spread speed, meteorological factor and terrain factor. This relationship is obtained when some external conditions are simplified. The important way to predict the behavior of the forest fire is based on the forest fire spread model. There are several main causes of the spread of the forest fire. Such as predicting the real-time spread speed, the length of the fire line, or the wind speed and wind direction of the fire field .The wind helps accelerate the evaporation of the water in the combustible material and reduces the water content of the ground vegetation. Conducive to the development of the forest fire, and also continually supply oxygen for the burning, accelerating the speed of the fire. When using the iterative method, the model is based on the Wang Zhengfei forest fire spread model. When the wind speed meets certain conditions and the wind direction is consistent with the direction of the nearby transmission line, make a judgment that the wind speed and the wind direction satisfy the fire pre-warning condition. Iteration means starting from a

given point $x^{(k)}$ and finding a successor point $x^{(k+1)}$ according to a certain algorithm. replace $x^{(k+1)}$ with $x^{(k)}$.Repeating the above process, and you can get a sequence $\left\{x^{(k)}\right\}$. When the iterative algorithm is used to solve the nonlinear programming problem, if we obtain the sequence points $\left\{x^{(k)}\right\}$ are finite, then the last point is the optimal solution to the problem. When the sequence points $\left\{x^{(k)}\right\}$ are infinite but converge to a limit point, this limit point is the optimal solution to the problem. In the general calculation process, the next iterative calculation can be performed as long as the initial point $x^{(0)}$ is given.

Assuming the result of the K times iteration of an algorithm is $x^{(k)} \in R^n$, and the result of the K+1 iteration is $x^{(k+1)} \in R^n$, Δx_k is the difference between the two results, ie

$$\Delta x_k = x^{(k+1)} - x^{(k)} \tag{3}$$

If the unit vector in the Δx_k direction is $p^{(k)} \in R^n$, you can make

$$\Delta x_k = \lambda_k p^{(k)} \tag{4}$$

Here we set $\lambda_k > 0$, substituting to (3) then as follows:

$$x^{(k+1)} = x^{(k)} + \lambda_k p^{(k)} \tag{5}$$

$\left\| p^{(k)} \right\| = 1$.The direction of $p^{(k)}$ point to $x^{(k+1)}$ from $x^{(k)}$. Generally, $p^{(k)}$ is regarded as the search direction of the k times iteration, as well as λ_k is regarded as the step of the k times iteration.

The key to the iterative algorithm for solving non-linear programming problems is to construct the search direction. All search directions have a common feature. The value of the objective function $F(x)$ at the point $x(k+1)$ is required to be smaller than the value at the point $x(k)$, that is:

$$F\left(x^{(k+1)}\right) = F(x^{(k)} + \lambda_k p^{(k)}) < F\left(x^{(k)}\right) \tag{6}$$

That is, the direction of $p^{(k)}$ should be the direction in which the objective function becomes smaller.

The general steps of the iterative algorithm in the establishment of the forest fire pre-warning model are as follows:

1) Select the initial point $x^{(0)}$, order $k = 0$;

2) Construct search directions;

3) Determine the step factor λ_k (the determination of λ_k should be based on the sum of $x^{(k)}$ and $p^{(k)}$, so that the value of the objective function is meaningfully reduced, that is $F\left(x^{(k)} + \lambda_k p^{(k)}\right) = \min\left(x^{(k)} + \lambda_k p^{(k)}\right)$, the step λ_k is determined according to the formula);

4) Calculate the next iteration point $x^{(k+1)}$ according to equation (5);

When equation $\left\| x^{(k+1)} - x^{(k)} \right\| \le \varepsilon$ (ε is sufficiently small) is satisfied, stop iterating; otherwise $k = k+1$.

The forest fire spread model proposed according to formula (2), K_1 and K_2 refer to Tables 1 and 2, respectively. we set $k = 0$, choose the initial spread speed $v(0)$, and construct the search direction and calculate the spread speed of the forest fire at any time according to equations (3), (4), and (5).\

3. EXAMPLE ANALYSIS

According to the above model, it is possible to calculate the spread speed of the forest fire based on remote sensing data. At present, the range of forest fire is approximately according to the data derived from the forest fire remote sensing, which is mapped according to the area of the forest fire, centered on the center of the forest fire. The specific forest fire spread analysis process is shown in Fig. 1.

Table. 1 Value of K1 for different kinds of combustibles

Types of inflammable	Ranch Prairie	Dead branch Fallen leaves	sedge Dwarf birch	Thatch Weeds	Tiled pine needle	Pinus yunnanensis
K1	2.0	1.2	1.8	1.6	0.8	1.0

Table.2 Value of K2 for different kinds of gradients

Gradient range	-42~-38	-37~-33	-32~-28	-27~-23	-22~-18	-17~-13	-12~-18	-7~-3
K2	0.07	0.13	0.21	0.32	0.26	0.63	0.83	0.90
Gradient range	-2~2	3~7	8~12	12~18	18~22	23~30	31~35	36~40
K2	1.00	1.2	1.6	2.4	3.0	4.2	6.0	10.1

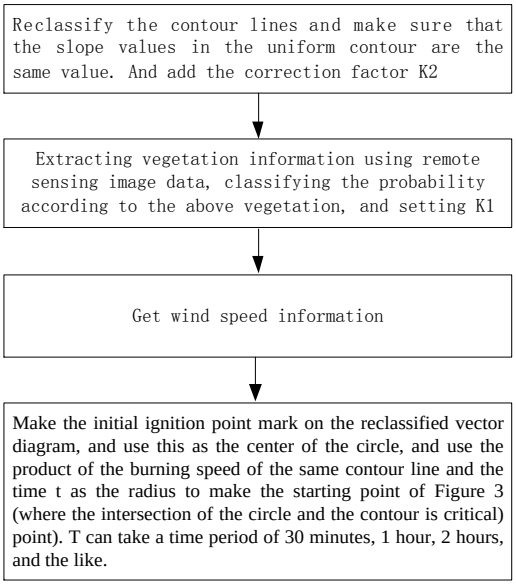

Figure.1 Frame of the implementation plan

The fire point must be defined before establishing the forest fire spread model and then assign the initial value to the point, and conclude the forest fire spread rules are shown in Fig. 2

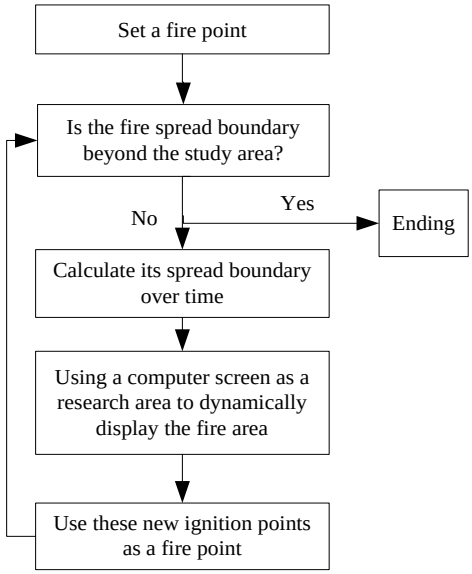

Figure.2 Frame of fire spreading rules

The fire point and its spread range are shown in Fig 3.

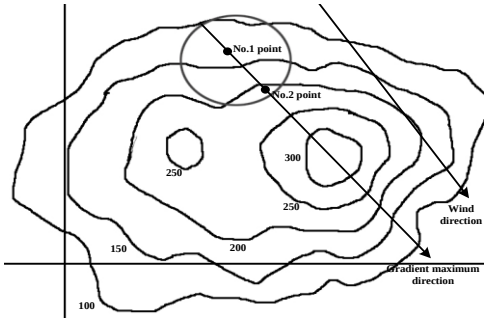

Figure.3 the original points of fire

Generally, large-scale power grid blackout warnings are divided into three levels based on the scope and severity of power grid outages, of which the first level is the highest level [9]. Through the analysis of the spread trend of forest fires, we can calculate whether the transmission lines will be affected and figure out which lines will be affected in the next half hour, one hour or two hours. The corresponding warning levels are shown in Tab. 3.

Table 3 Risk score table

Time period	Transmission line hazard level	level
30 minutes (half an hour)	It is expected that the impact of the forest fire on the line is extremely dangerous.	First level
60 minutes (one hour)	It is expected that the forest fire will cause significant danger to the line.	Secondary
120 minutes (two hours)	It is expected that the forest fire may cause danger to the line.	Third level

According to the analysis of the forest fire spread model, the forest fire pre-warning analysis maps within half an hour, one hour and two hours are respectively drawn by computer language simulation, as shown in Fig. 4, Fig. 5 and Fig. 6, respectively.

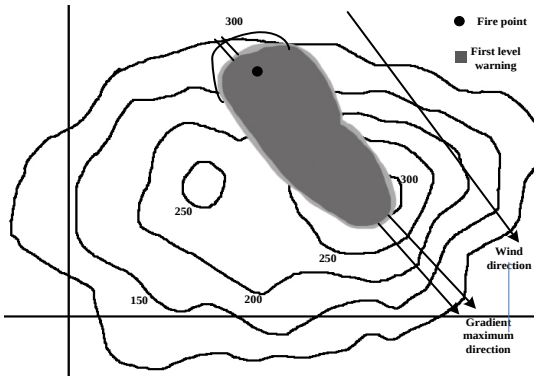

Figure.4 Pre-warning analysis diagram in half an hour

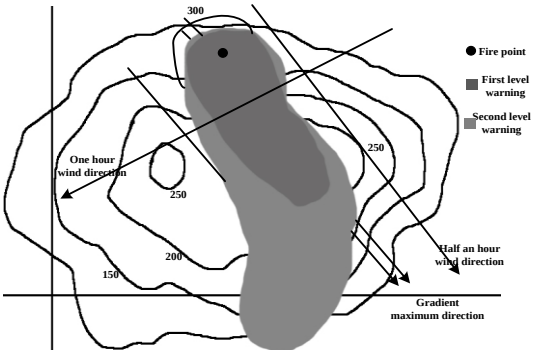

Figure.5 Pre-warning analysis diagram in an hour

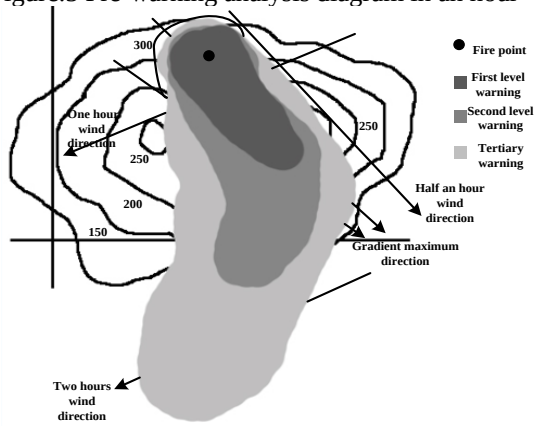

Figure.6 Pre-warning analysis diagram in two hours

4. CONCLUSION

This paper mainly introduces the application of the forest fire pre-warning model in the power transmission line of the power system. It is based on the Wang Zhengfei forest fire forecast model, calculating by iterative algorithm. It can not only consider the influence of the wind direction and slope that affects the fire spread weight greatly, but also consider the influence of factors such as the nature of the fuel bed. It can make the calculation of the spread speed of fire more accurately, and the range of the disaster closer to the actual fire range. Finally, verify the validity of the model by an example.

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REFERENCES

[1]Li Heng, Discussion on measures for preventing forest fires on transmission lines, China Electric Power Education, 2009,25(1):240-240.

[2]Niu bo, Yao lin, et al., Probe into Multiple State Information Monitoring System of High Voltage Transmission Lines Based on 3G Internet on Things, Smart Power, 2013,12:56-57.

[3]Xing YuanXiu, Nan DongFang, Yu Le, et al, The Forest Fire Warning System Research and Development, Computer Knowledge and Technology, 2011,7(16):3923-3924

[4]Li Yong, Tao Xiongjun, Chen Li , The Analysis and Precautions of Forest Fire Fault to Transmission Line, Hubei Electric Power, 2010,34(60):50-51.

[5]Ye LiPing, Chen Xi Yang, He ZiLan, et al. Present situation of forest fire early warning technology used for transmission line, Power System Protection and Control, 2014,42(6):145-150.

[6]Zhang Jiang, Liao Kui. Forest Fire, Accident Early Warning and Emergency Command System Based on GPRS and 3S Technology, Computer Knowledge and Technology, 2011,7(21):5250-5251.

[7]Ma HongFeng, Li Xiang Lin,Forest Fires, Process Automation Instrumentation, 2011,32(12):39-40.

[8]Hu Xiang, Lu JiaZheng, Zeng XiangJun, et al, Analysis on transmission line trip caused by mountain fire and discussion on tripping preventing measures, Journal of Electric Power Science and Technology, 2010,25(2):73-78.

[9]Feng Nan, Guo LiJuan, Fu JinWei, Ma Jin, Research Summary of Power System Stabilizer, Smart Power, 2013,11:45-47.

Quantitative Research on The Application and Development of Self-Service Equipment in Local Universities

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Abstract: In the information age, artificial services are far from meeting the needs of the changing times. Therefore, it is bound to become a trend that self-service equipment replaces the overall environment of manual operation. Taking self-help printing as an example, this paper discusses that traditional printing shops in colleges and universities have been unable to keep up with the development of The Times and meet the new needs of teachers and students in colleges and universities. The operation of self-service printer can provide people with a new way to solve the printing needs. Research in huanggang normal university as an example, quantitative statistical analysis of the questionnaire was designed and a questionnaire survey to all students, using SPSS software to analysis the related data, the feasibility study self-help printers in the colleges and universities and analyzes its prospect, think in university installed self-help printers has great feasibility and acceptability. This paper deduces the prospect and value of installing self-service equipment in colleges and universities, and makes an outlook on the design and conception of self-service equipment. The study has certain reference value for the practical educational business operation.
Keywords: Self-service equipment; Self-service printing; Investigation and analysis.

1. INTRODUCTION

In the history of economic development, the development of productive forces and social division of labor is the fundamental driving force for economic development, from barter exchange to Commodity Exchange with general equivalent as the medium, and then to commodity circulation with money as the medium. Under the background of highly developed information technology, the mode of business operation is also undergoing great changes, which has crossed from service economy to experience economy era. Physical stores are not only impacted by online marketing, but also the service industry is gradually transformed with the impact of intelligent economy: from active service provision to self-service for machines and online platforms, from intensive manual service to unattended consumer self-service [1-3]. Consumers in self - service can more clearly their preferences, urgent needs, experience the new era of high-tech convenience and novelty. In the banking system, railway departments, hospitals, retail and other fields are popular public self-service equipment use, such as self-service deposit or ATM machine, self-service check-in machine register, self-service ticket machine, automatic machine, self-service coin charge system, self-help vending machine, paper machine, etc have been used by the general public to accept and skilled [4-6]. The education industry has quietly joined the self-help system. Access to the library, dormitory building, self-help borrowing and book return system, has been removed in daily life time-consuming queuing and manual mechanical operation. Does the college still have the self-service equipment that teachers and students shoot and need? How can self-service devices better serve teachers and students? This paper takes self-help printing as an example to carry out investigation and research, and puts forward analysis and assumption, providing reference for practical application.

2. RESEARCH ON SELF-HELP PRINTING

2.1 Current situation of college printing market

Teachers and students in colleges and universities need to print a large number of paper documents in literature, questionnaires, various learning materials, admission certificates and photos, which is usually an extremely urgent and important daily work. However, due to the business needs of strong randomness of time, high urgency, the current traditional management model of physical stores has been unable to meet the flexible needs of teachers and students for printing. With the high-speed development of information age, some colleges and universities in first-tier cities have introduced the operation mode of the “Shared + print”, this new tool provides self-help printers, the campus market, created a whole new facilitate students not be restricted by time and distance of uploaded to the online platform anytime and anywhere, according to their own needs to choose print time and place.

Self-service printer is an unattended intelligent printing device connected to the network terminal. It sets laser printer, touch screen computer, multi-function stapler, multiple types of paper machine in one, flexible service in school teachers and students, adapt to the fast pace, more changes in modern life needs. Nowadays, the informationization construction of colleges and universities has been gradually improved, and they can provide all kinds of high-

quality services for teachers and students in the campus. The Shared self-service economy has stepped into the contemporary trend, and the self-service printing field will also be paid attention to. At present, about self-help is not enough in-depth market research, the scope of its implementation is not widely, to analyze the development prospect of self-help printers in colleges and universities, this article will through the analysis of the existing problems of solid print shop, and huanggang normal college students with a questionnaire survey was conducted as the research object, and then with statistical data analysis function of SPSS software analysis of survey data, and then analysis the prospect of self-help printers in colleges and universities.

2.2 Existing problems of physical print shop

In huanggang normal university, for example, nearly twenty thousand students, more than a dozen college, close to a student organization, whether due to study or work on demand, demand for printing in the teachers and students is higher, especially during the event and face the final exam is printed during rush hour, the printer is in short supply. At present, students of huanggang normal university print the required materials in the campus and the printing shops outside the campus. However, the number of printing shops in and around the campus is insufficient and the business is uncertain. According to the investigation, there are altogether 4 print shops near the erudite building, library and the college students' activity center and student canteen in the south district, and the south district and the north district open two each, which often cannot meet the needs of printing in school.

In addition, the printing process of excessive time consumption is one of the existing problems of the physical print shop. The department building where teachers and students attend classes is far away from the printing shop, which requires a lot of time to spend on the journey and waiting in the printing shop. According to the reflection of the students, students' daily learning both in the classroom building, organize activities focus should learn floor lecture hall with one thousand people, but in fact the biggest customer knowledge building of external printing shop in addition to the normal class time is close the door closed over the weekend, the library of the printing shop business time is short, outside the printing shop journey far, expensive, due to factors such as time, location, and prices affect the printout is not quick, resulting in the phenomenon of the low efficiency of learning and work.

Third, the quality of traditional printing services is uneven, and the security is not guaranteed. Due to the high demand, the store is narrow and crowded, and the service personnel often send out tasks without understanding the printing requirements, which leads to the students' low satisfaction with their work. At the same time, some graduation thesis, student associations and other printed documents store store security factor is low, plug and pull usb flash drive cause virus epidemic. The existence of such security risks is troubling everyone.

3. QUESTIONNAIRE SURVEY AND DATA ANALYSIS

3.1 Design and implementation of questionnaire survey

The main steps of the questionnaire survey are divided into six steps. The first step is to identify the target of the investigation. The second step is to design survey dimensions and related indicators. The third step is to design the questionnaire according to relevant dimensions and indicators. The fourth step is to establish a small sample, carry out a questionnaire survey, conduct pre-test, and modify and improve the questionnaire. A large sample questionnaire survey was conducted again. The fifth step is data collation and analysis. Step 6: draw conclusions and make recommendations.

This study focuses on self-help printing projects in the independent market. The purpose of the investigation is clear. It is mainly to understand the feasibility and acceptability of self-help printers in colleges and universities through students' requirements on printing, and to predict their prospects. There are 22 questions in this questionnaire, and the contents of the questionnaire are generally divided into three dimensions: 1. 2. Questions 4-11 are about the printing time, place and other requirements of the respondents for printing; Questions 12-22 are the subjects. They are the survey subjects' satisfaction with printing shops and acceptance of self-service printers. The 22 questions are all multiple-choice questions, among which 14, 15 and 18 are multiple-choice questions, and the remaining 19 are all single-choice questions. After designing the items, the questionnaire was generated by “questionnaire star”. Undergraduates of huanggang normal university were selected for pre-test, and statistical analysis was conducted in the early stage. Then, some students were interviewed to improve the questionnaire. In later made into a formal questionnaire, in order to ensure the randomicity and effectiveness at the same time, in the questionnaire, select huanggang normal college students, undergraduate and graduate students to random online questionnaire survey, questionnaire 137, recover the questionnaire of 137, recovery rates were 100%, effective questionnaire 135, 98% efficient demand by simple random sampling sample size. In order to ensure the convenience of data statistics, code statistics was carried out and entered into the Excel table to prepare for relevant analysis of data by SPSS 22.

3.2 SPSS data analysis

SPSS software is developed by software companies in the United States after the development of continuously updated version of the social science statistical package, its advantage is that data management and analysis capability is strong, easy to operate, simple interface, data analysis capability is

strong, has a variety of analysis model, the result output visual clarity, there are a variety of statistical graph form, is currently the international popular a kind of authoritative statistical analysis software, has in-depth application in many areas.

(1) Preparation

The first step was to input variables in the variable view of SPSS software. The questionnaire was scored by Richter scale of 5, in which the item name of single choice was x plus the number of questions. The range of values was from 1 to the maximum number of choices. For example, the name of the variable is x2, the label is grade, and the value range is 1-5,1: freshman, 2: sophomore, 3: junior, 4: senior, 5: graduate.

Think of each choice on a multiple-choice test as a dichotomous variable. Zero means not selected and one means selected. If you have multiple choices in a multiple-choice question, you're going to break it down into multiple choice variables, which are still going to be 0 or 1.

The second step is to input the variable setting and coding in the variable view. The third step is to input 135 valid questionnaire data into the SPSS data view to complete the preparation of the data in SPSS.

(2) Reliability analysis

In the pre-test work, after the modification and improvement according to the analysis, the reliability analysis of the questionnaire was carried out again. The output results showed that the alpha coefficient was 0.829, between 0.8-0.9, indicating that the questionnaire had a good reliability and could be used for formal investigation.

(3) Correlation and regression analysis

In order to directly observe the feasibility and acceptability of self-service printers in colleges and universities, as well as their prospects, SPSS 22 was used to carry out correlation and regression analysis. Correlation analysis first need to put the variables view of 39 for dimension reduction processing, the first dimension for basic information of dimension 1-3 (average), the second dimension for demand dimension (4-11 average), the third dimension for basic information dimension (average) of the 12-22 question, finally get basic information of dimension and dimension of demand, accept the case dimension three columns of data, and then after the dimension of three dimensional correlation analysis, correlation analysis results show that when N = 1, With a sample size of 135, the significance between the basic condition dimension and the demand dimension is 0.001, the significance between the acceptance dimension and the basic condition dimension is 0.023, the significance between the demand condition dimension and the acceptance dimension is 0.002, and the significance between the two dimensions is greater than 0. It can be seen from the correlation analysis results of influencing factors that the basic situation and the demand situation, the basic situation and the acceptance situation, and the demand situation and the acceptance situation are positively correlated.

To the acceptance of self-help printers in the linear regression analysis, explore the print price, and security for self-help printers the influence degree of acceptance, in SPSS, select the “analysis” - “return” - “linear regression”, as the dependent variable is receptive, independent variable for printing and security price, method selection “enter”, some “ok” to get the results of the analysis. After analysis, it is known that model R squared is 0.851, indicating that printing will and security are the reasons for 85.1% change in acceptability. In F test, $F=51.579$ and $p<0.05$ indicate that at least one of the two factors will have an effect on the dependent variable. The linear regression formula of the model is: acceptability =1.013+0.681* print price +0.122* security. As the regression coefficient of print price is 0.681, its p value is 0.002, less than 0.01, indicating that print price will significantly affect acceptability. The regression coefficient of safety is 0.122, and its p value is 0.045, less than 0.05 and greater than 0.01, indicating that safety has a certain effect on acceptability.

(4) univariate factor analysis

One-way variance analysis was conducted on the selection factors of acceptability, print price and security in the three dimensions to analyze the optimal value of print price and security that affect the acceptance degree of self-service printers in school.

Select the X13 factor in the printing price dimension, perform univariate analysis on it and whether it is necessary to install self-service printer in normal school for univariate linear model, check the mean value graph, and refer to the reasonable situation. According to the mean value graph, when the printing price of a single page is around 0.1, the acceptance degree of self-service printer is relatively high.

Acceptance for X21 safety factor and the results of univariate analysis can be seen from the average figure security is not enough to become the main effect of acceptance dimensions, but it is still not negligible, some consumers higher safety consciousness, improve safety of self-help printers to ensure information security in consumer satisfy consumer satisfaction effect.

4. CONCLUSIONS

According to statistics, college students are not satisfied with the traditional printing services. Research by designing questionnaire, investigation and analysis the feasibility and acceptability of self-help printers in colleges and universities, by predicting its development prospects, the correlation analysis indicates that the basic situation, the demand situation, accept two effects are related to each other, regression analysis, and then suggests that safety and print price acceptance of self-help printers in colleges and universities have influence, and forecasts the part print project price expectations. Secondly, with reference to the example of self-service vending machines, the

paper proposes to occupy the market. More and more operators expect to pour into the campus in the trend of self-help trend, such as the current unmanned retail "youbao" has entered the teaching buildings. In order to make the self-service printer market bigger and better on campus, on the one hand, the operators themselves should increase the efforts of technology research and development to predict the market ahead of consumer demand. On the other hand, the school can leave high-quality operators in various ways in the future to make the campus construction more intelligent and students' life more convenient and modern. Of course, the most important thing is that the operators should compare and analyze the maintenance mode of self-service equipment, which is quite different from traditional equipment in the past. They should consider how to operate it to better meet the needs of operation management, and still pay attention to how to better use the equipment to serve the public humanly. How to develop new service functions and high-tech quality, more in-depth and more advanced service to the public? For example, you can choose A4 and 16K paper sizes for common self-service printers. Can you choose A3 paper types? In addition, college students often make business design books, graduate job-hunting books, are you able to increase self-help printer color printing function, binding function? That is to say, the type of service aao more comprehensive, more humane will have a bigger market, get a bigger profit space.

According to the above analysis, in institutions of higher learning with dense crowd, teachers and students are still looking forward to the arrival of self-service equipment on campus. Moreover, due to the high cultural attainment of the crowd, they can understand the functions of self-service equipment and get familiar with the use of self-service equipment faster than social personnel. The history of apple, where simplicity is king, shows that "good user experience is conquering the world bit by bit." The functions and personal experience that users really need have become the focus of apple designers' efforts, focusing on the functions and personal experience that users really need. Therefore, the design and use of campus self-service equipment should be more from the perspective of consumers and develop more products, not just self-service printers. In addition to the student's dormitory available self-service washing machine, self-service hair dryer, self-service microwave oven and other life must tend, learning aspects of self-service printer, self-service library equipment, whether can also be developed to pay attention to the emotional aspects of teachers and students self-service equipment. For example, similar to the current "vindicate wall" in many colleges and universities, can we develop a self-service "campus bosom friend" for voice robot service to answer students' school and learning affairs and guidance? Some psychological perplexity of college students in order to avoid the pain of the human face to face talk yourself, and go to school counseling room need to make an appointment and queuing, often makes the existing problems, whether to develop self-help psychological counseling robot platform, for example, the device can be copied in the form of the library of form a complete set of self-help read pavilion, there is a first for separate interval can communicate easily.

In a word, taking self-service printing as an example, it shows that the operation prospect of self-service equipment in the higher education market is considerable. At the same time, more advanced and user-friendly self-service devices can be developed to enter the market. Of course, more detailed information must be investigated and analyzed in depth.

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REFERENCES

[1]Wu minglong. Questionnaire statistical analysis practice -SPSS operation and application. 1st edition. Chongqing: chongqing university press, 2010.

[2]Zhong jiuxiang. Design research on intelligent self-service printer service for public traditional environment. Beijing institute of technology, 2015.

[3]Yang chenggen, Yang qin. Application of SPSS project analysis in questionnaire design. Journal of advanced correspondence (natural science edition), 2010, 23 (3): 107-109.

[4]Zhong jiuxiang. Design research on intelligent self-service printer service for public environment. Beijing institute of technology, 2015.

[5]Jiang Lei, fan following wei. The campus "cloud print" model study. Journal of propagation force research, 2018, 2 (34): 192-193.

[6]Sherry Koshman. Visualization-based information retrieval on the Web Library & information Science Research. 2006, 28(2):192-207.

The Enlightenment of The Vocational Education Model of Nanyang Technological Institute to The Transformation and Development of Local Colleges

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Abstract: With the transformation and development of local colleges and universities, cultivating students' vocational ability and quality and building "double-qualified" teachers have become the focus of the transformation and development of local colleges and universities in China. This is not only the inevitable requirement of transformation and development, but also the leading direction of vocational education reform. Developed countries have accumulated a lot of useful experience in the field of innovative vocational education. Taking nanyang technological institute of Singapore as an example, this paper discusses the reform and innovation of the transformation and development of local colleges and universities in China by introducing their advanced vocational education concepts and models.
Keywords: Nanyang polytechnic; Vocational education; Transformation of development.

1. INTRODUCTION

At present, China's economy and society is in the historical stage of industrial transformation and upgrading and rapid development of public services, which requires a large number of high-level skilled personnel. Local universities should seize this historical development opportunity, further establish education oriented and vocational demand-oriented education philosophy, strengthen the training of technical and skilled personnel, and strive to solve the bottleneck problem in the development of local universities [1-3]. Now the Ministry of Education is guiding and promoting the transformation and development of local undergraduate colleges and universities to the applied technology type, which makes the higher education reform become the focus of people's attention again. The transformation and development of local undergraduate colleges is a kind of system and mechanism innovation, which not only gets through the connection between general higher education and higher vocational education, but also realizes the higher vocational education at the undergraduate level, and further deepens the training of applied technology talents. Therefore, in the process of transformation and development of local colleges and universities, vocational skills education must be strengthened in order to cultivate application-oriented talents [4, 5].

As a developed educational country in the world, Singapore has a complete and mature innovative education system and attaches great importance to vocational education. Paying attention to the cultivation of citizens' innovative spirit and professional ability is one of the important reasons for their strong national strength. Taking nanyang technological institute as an example, this paper discusses the enlightenment of its vocational education model on the transformation and development of local colleges and universities in China.

2. PRACTICAL TEACHING OF "TEACHING ENTERPRISES"

Nanyang technological institute (nanyang technological institute) is currently ranked the first higher vocational education institution in Singapore, with a current enrollment of 15,000 students and 1,300 full-time faculty and staff. The purpose of the school's curriculum is comprehensive basic education, appropriate professional skills education, the development of lifelong learning ability, to promote the understanding of internationalization. The teaching concept of the whole school is to promote the practice-based teaching method, to arrange the teaching of practical subjects through "teaching enterprises", and to reasonably arrange teachers' teaching tasks and effectively use teaching resources through "double-track" teaching.

Teaching Factory adopts CDIO Teaching mode. CDIO at the Massachusetts institute of technology (MIT) by the United States department of aerospace launch international engineering education cooperation organization, the curriculum to meet the United States, Canada and other Washington agreement to the requirement of engineering education, national professional engineer group teaching framework is the comparison system and innovation in the world, nanyang institute of technology is one of its members. This teaching factory is small in scale, but it is more innovative, and the teachers are of high level. Teachers introduced that students here mainly receive work attitude and work skills training, the first is work attitude, work attitude on a person's development plays

a key role. Through this comprehensive training, students develop a positive work attitude, know how to work, know how to interact with others, understand why there should be team spirit. The situation of accepting knowledge creates a new teaching mode in which students can actively participate, cooperate with groups and be brave in innovation. The focus of students' learning is the process of combining learning with practice, which reflects the function of combining theory with practice.

2.1 The concept of "teaching enterprise"

Enterprises "teaching" is not really true, it is on campus, introducing the actual enterprise environment teaching in a training platform for teaching students practical subject, causes the student to learn in the real business environment, learning life skills available to strengthen the market competitiveness of students, for students to learn the real skill method to build the foundation. It takes the college as the standard, establishes in the existing teaching system (including theory course, tutorial course, experiment course and project arrangement) the foundation, the omni-directional construction enterprise practice environment. It is the organic combination of enterprise practice, enterprise project and school teaching.

The teaching purpose of "teaching enterprise" is to integrate the actual enterprise environment into the teaching environment on campus and integrate them together, so that students can understand the basic requirements and procedures of enterprise operation and management and enhance the sense of teamwork in the second year. The project is an indispensable and important link in the "teaching enterprise", which enables students to apply the knowledge they have learned in a diversified and multi-level practical environment. It is based on the existing education system (including theoretical courses, tutorial courses, experimental project courses, etc.).

"Teaching enterprise" is also very important, that is, the strict assessment of student's management. Nanyang technological institute's experience is that students do not have to bear financial losses if their work in the "teaching enterprise" project is not completed (such as the loss of the small shop they run, the failure of the project they are responsible for, etc.), but their grades in the second year are counted as unqualified and they must be repaired the next year and pay an extra year's tuition. This will give students a lot of pressure and motivation to make their own efforts.

2.2 Selection of "teaching enterprise" project

Nanyang technological institute is very strict in the selection of teaching enterprise programs. First, to be suitable for students to intervene, second, to be suitable for training students' ability, third, to have advanced consciousness. As a result, in the various "teaching enterprises" introduced by the college, we see projects closely related to the industry. These practical training not only exercised students' language skills well, but also cultivated their good sense of service in advance. E-teaching is widely used in nanyang technological institute. Fellow teachers also put their own curriculum and content of the project on the Internet, providing students with a lot of convenient, make the student in any place can be according to the requirements of the teacher to study or answering questions such as, Singapore students better learning conditions, most of the students themselves have wireless laptop, portable, leisure area, home, in school can learn in the park. In addition, students also undertake the task of helping teachers design various courseware and write teaching games. This not only greatly reduced the work load of teachers, but also exercised the students' computer ability.

The difference between "teaching enterprise" and in-school training courses in Chinese universities lies in the following: first, all the projects of "teaching enterprise" are real and come from the real needs of enterprises, and the person in charge of the enterprise center of the college selects the projects suitable for students to participate in and carry out the teaching of "teaching enterprise". Second, teachers are required to maintain the same level as managers in the business community. Teachers should be sent to relevant enterprises to participate in the research and development of new projects or to learn new knowledge in the economic field. More than 15% of nanyang technological institute's faculty members are sent to receive training in new technologies every year. Teachers are also required to lead students to cooperate in the development of projects provided by enterprises. Such benefits enable students to understand what is the supplier standard, customer service level, industry standards, product quality and team spirit, so as to promote students' comprehensive understanding of enterprises and practice what they learn to apply.

2.3 Enlightenment of "teaching enterprise"

(1) it can lay a good foundation for students' professional practice and help the development of "school-enterprise cooperation"

At present, "project teaching" method prevails in the transformation and development of local colleges in China, but such simulation teaching cannot represent the real environment of enterprises. As a result, most local schools send students directly to companies for professional internships in the fourth year. Although this practice teaching can make students in advance before really step into society realize the real business environment, but there are a lot of students are still holding the indifferent attitude, do not cherish the internships provide internships, discipline and work error rate is high, not only brought bad influence to virtual enterprises, the most important thing is, can make school, teachers have worked so hard to build a training base. If the build similar enterprise "" teaching" education supermarket ", "teaching" and "teaching to the workshop" or "center", and some business or IT, the manufacture enterprise cooperation, the introduction of allows students to participate in real

project, and the implementation of strict discipline management, local colleges and universities in China not only can cultivate students the basic professional ability, project development ability and entrepreneurial skills, etc., can also encourage and develop the students' spirit and the spirit of enterprise ability of practical application, to ensure relevant training course linked to the demand of the industry, promote the school contact the business. More importantly, it enables students to get real “vocational education”, realize “seamless connection” from the theory class to the enterprise class, and contribute to the development of “school-enterprise cooperation”.

(2) The potential of students can be better cultivated

Students' potential includes innovation ability, development ability, teamwork spirit and the ability to solve practical problems. Therefore, in a real enterprise learning and enterprise project development, teachers constantly guide students to innovate boldly, divergent thinking, and strive to find better methods, and students' innovation ability has been cultivated. At the same time, in the development of the project, students learn together research problems, solve problems, play to the wisdom of the team, the final results, lets the student in the process of solving the problem to realize the importance of teamwork, the cultivation of student's team spirit in the process of collaboration, enhance their ability to solve practical problems. Therefore, make the teaching process and flow of enterprise operational management fuses in together, not only can make teachers teach more real, also can let students learn more practical, and greatly accelerate the combination of theory with practice, it also effectively promote students' understanding of the real environment, so that the future can faster into the plant production process, validation from enterprises.

(3) Ensure that the teaching needs of the school are consistent with the needs of the enterprise

Building enterprise ““ teaching, also requires in college curriculum design to obtain the information of the enterprise, and the content of the professional course should have advanced consciousness, so that the students can learn practical and has certain advanced knowledge of science, so college would provide enterprises with the most applicable talents and the best service, to help enterprises realize the future ideal, win the trust of each other and sure, build closer ties, to ensure that their students in an impregnable position in the increasingly severe employment situation in the future. So-called “comes from the enterprise, for enterprise”, the institute, “teaching enterprises”, enterprises “three yuan”, the enterprise environment brought into schools, the school set up advanced technology, facilities, environment, vivid teaching environment, the organic combination of theory teaching and practice teaching, cultivating students' practical working ability, improve students' comprehensive quality.

(4) “Teaching enterprise” is an important way for the college to improve the quality of teachers

In the “teaching enterprise”, project development is a crucial link. In the process of continuous research and development, the college's professional development ability has been improved naturally, in addition, the college's most valuable resource -- “teachers” ability has been more professional training. In the process of teaching, teachers and students learn and study together, which can constantly update the knowledge structure and continuously surpass themselves.

3. TEACHER TRAINING AND SPECIAL ABILITY DEVELOPMENT

3.1 Teacher recruitment

Nanyang technological institute has not set too high a qualification threshold for teaching when recruiting staff. Nanyang technological institute teachers do not have to graduate from a normal university, nor do they have to have a master's degree or a doctor's degree, but they must have more than 3-5 years of experience in important positions in large enterprises or multinational enterprises. After being admitted as a regular faculty member, post allocation and corresponding training will be conducted according to their specific working qualifications and experience.

3.2 Dedicated

Nanyang technological institute's “teaching enterprise” and classroom teaching staff in the scope of work is a strict distinction. Teachers in classroom teaching only focus on the teaching of theoretical knowledge in class, pay close attention to the development of the industry situation, pay attention to the auxiliary learning of practical knowledge, so as to make the knowledge acquired by students adapt to the project teaching of “teaching enterprises” and adapt to the development needs of the industry. Teachers of teaching enterprises focus on the relationship with enterprises, so as to match the introduction of enterprise projects with the teaching of the project center, focusing on the development planning of the project center, process planning, the formation, guidance and assessment of the student project team. Classroom teachers and “teaching enterprises” teachers assume the daily workload, pay roughly the same. As the saying goes, “there is specialization in skills”, the distribution of teaching positions enables each teacher to concentrate on doing what he/she is good at, and at the same time promotes the enthusiasm of the faculty in independent research and development, and develops their innovation and creativity.

3.3 Lifelong training system

Not only in China, but also in large enterprise groups in many developed countries, employees over 50 are considered to have lost the value of training. At nanyang technological institute, no matter how different your age or your academic attitute, everyone will enjoy equal training opportunities for life, provided that you want to improve yourself and make contributions to nanyang technological institute.

It is under this mechanism that nanyang technological

institute teachers always keep the spirit of dedication, active learning and cooperation. From this also cultivated an innovation, advanced, willing to work hard, keep improving the excellent teaching staff.

3.4 Enlightenment of "double-division" training

Local colleges and universities in China are now introducing teachers, the qualifications of the "threshold" set higher and higher. Nowadays many colleges and universities regard doctor's degree as one of the necessary conditions to recruit teachers. As a matter of fact, there are many master's and doctor's degrees from universities and colleges with no enterprise experience. When conducting vocational education, they will only follow the script, which brings great obstacles to curriculum reform, teaching method improvement and talent cultivation mode innovation. The Ministry of Education clearly stipulates that the introduction and training of "double-qualified" teachers should be strengthened, and enterprise experience is an indispensable condition for "double-qualified" teachers. Therefore, in the construction of teaching staff, can we consider the practice of nanyang technological institute for reference? For example, when introducing teachers, enterprise experience is an indispensable condition, and academic qualifications can be appropriately relaxed. Moreover, respectively set up in the school classroom teaching and practice teaching are relatively independent of the teacher group, also can mutual crisscross, but classroom teaching teachers focus on imparting theoretical knowledge, curriculum improvement, etc., while the teacher can focus on the practice teaching and the connection between the enterprises, with the help of good corporate networks, introducing a good project for students to practice outside the campus training or etc., so that we can well realize the teacher can "special". The training of teachers should be planned, targeted, timely adjusted to the industry situation and corresponding to the needs of enterprises.

4. CONCLUSION

In the promotion of the transformation and development of local colleges and universities, nanyang technological institute's vocational education model plays a good role in the transformation and development of local colleges and universities to the type of applied technology, especially in the "school-enterprise cooperation", "professional practice", "double teacher quality" and other aspects of particularly important.

REFERENCES

[1]Li chunling. on the characteristics and enlightenment of higher vocational and technical education in Singapore. education and vocational, 2008 (9).

[2]Wang xuefeng. development and enlightenment of higher vocational and technical education in Singapore. vocational and technical education, 2001 (31).

[3]Yuan yu. detailed the enlightenment of "teaching factory" model of nanyang technological institute of Singapore. henan education, 2015 (11).

[4]Wang tianzhi. concept and inspiration of "teaching factory" of nanyang technological institute of Singapore. journal of shaanxi vocational and technical college, 2013 (3).

[5]Zhu junhong. educational philosophy and inspiration of vocational education of nanyang technological institute of Singapore. asia-pacific education, 2016 (20).

Generalized Design Optimization of Self-learning Fuzzy Control Strategy of AC traction motor for Electric Locomotive

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Abstract: A parameter self-learning hybrid fuzzy controller was implemented to provide the speed control for the traction motor of electric locomotive with the purpose to obtain the maximum acceleration during starting and accelerating. A three-term fuzzy controller is implemented by simply using a two-term fuzzy control rule-base without any increase of rules. The method of fuzzy inference based on phase plane had less computational burden, while the fuzzy inputs could be continuous. The control parameters are self-tuned by introducing a single neuron together with a back-propagation learning algorithm. This method has simpler structure and control algorithms and can be realized online easily. The simulation results and experiment results of 18kW PMSM in electric locomotive are given, the experiment results show that the electric vehicle with parameter self-learning hybrid fuzzy vector control system has excellent performances of starting, accelerating and cruising on road.

Keywords: Electric locomotive; Permanent magnet synchronous motor (PMSM); Parameter self-learning Fuzzy control strategy

1 INTRODUCTION

With the rapid development of automobile industry, the air pollution problem caused by internal combustion engine automobile are becoming more and more seriously. With the advantage of high power density, high efficiency and good accelerated ability[1], PMSM vector control system are used in electric locomotive propulsion.

Due to their simplicity and robustness, the PID controllers are widely used in the industrial process control[2-6]. But conventional PID controller with fixed parameters can hardly adapted to speed control of the AC motor in propulsion application[7-9]. For one thing, the traction motor for electric locomotive has the characteristic of high power density, atrocious work condition and motor parameter varying during operation, which bring great challenge for common PID controller. On the other hand, PMSM can not be expressed with simple mathematics model due to the non-linear and strong coupling of the inner parameter. Both theoretics and practice show that the common PID controller can not achieve satisfied performance. Not based on the precise mathematics model of the motor, fuzzy control [3] can overcome the inherent limitation of the common PID[4] controller and can obtain good Robustness resisting the parameter varying. Since basic fuzzy controller lack the ability of self-learning, an improved hybrid fuzzy controller for electric vehicle is proposed. The control parameters are self-tuned by introducing a single neuron together with a back-propagation learning algorithm.

To testify the validity of the proposed method, the simulation results and experiment results of 18kW PMSM for electric locomotive traction are given, the experiment results show that the traction system with parameter self-learning hybrid fuzzy vector control system has excellent performances of starting, accelerating and cruising on road.

2 MODEL OF THE PMSM

For a PMSM with sine wave back electromotive force, the magnetomotive force、voltage and electromagnetic torque equation based on d-q reference frame can be expressed as following [2],

$$\psi_d = L_d i_d + \psi_f \tag{1}$$

$$\psi_q = L_q i_q \tag{2}$$

$$u_d = R_s i_d + p\psi_d - \omega\psi_q \tag{3}$$

$$u_q = R_s i_q + p\psi_q + \omega\psi_d \tag{4}$$

$$T_e = 1.5 n_p (\psi_d i_q - \psi_q i_d) \tag{5}$$

In which,

ψ_f —magnetic field produced by the rotor;

$\omega = n_p \omega_r$ — ω_r is rotor speed;

n_p —pair of poles of the motor ;

R_s —stator resistance;

p —differential coefficient oprator;

L_d、L_q —induction of d and q axis;

i_d、i_q —stator current of d and q axis;

u_d、u_q —stator voltage of d and q axis;

Supposing ψ_f is a constant, from Equation (5) we can see that electromagnetic torque of the PMSM is determined by i_d、i_q exclusively. Rotor magnetic

field oriented control method will be used in this application.

3 CONFIGURATION OF PMSM PROPULSION SYSTEM

Fig.1 shows the diagram of PMSM control system. In this system, the ECU incepts the instructions send out by the driver using the pedal, and calculates the target speed nref for the motor controller. The real speed of the motor collected by the motor controller is compared with the target speed nref, and the speed controller use the speed error as input. In this system, parameter self-learning fuzzy arithmetic is employed to perform speed tracking and normal PI arithmetic is used also for current loop to achieve quick response of current tracking.

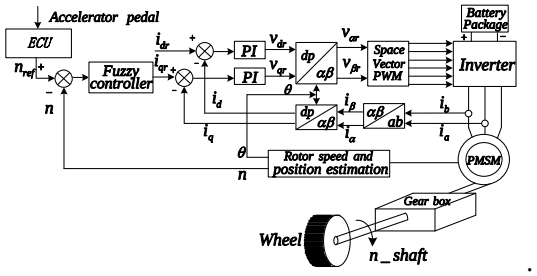

Fig. 1. Control diagram of AC traction System for electric locomotive

4 DESIGN OF PARAMETER SELF-LEARNING FUZZY CONTROLLER

Compared with traditional control scheme, fuzzy control has good robust stability. However, it is also true that pure fuzzy control method can not eliminate the static state error of system, which leads to a lower control precision inevitably. As we all know that PI arithmetic can eliminate the static state error easily, so if we combine the fuzzy control method with the traditional PID method, the drawback of the fuzzy method can be solved effectively.

In this paper, a three-term fuzzy controller is designed by simply using a two-term fuzzy control rule-base without any increase of rules. The method of fuzzy inference based on phase plane had less computational burden, while the fuzzy inputs could be continuous. The control parameters are self-tuned by introducing a single neuron together with a back-propagation learning algorithm. This method has the remarkable characteristic of simpler structure and control algorithms can be realized online easily.

4.1 Design of the Fuzzy Rule

A three-term fuzzy controller is designed by simply using a two-term fuzzy control rule-base without any increase of the rules. The method of fuzzy deduction based on phase plane had less computational burden, while the fuzzy inputs can be continuous. The control parameters are self-tuned by introducing a single neuron together with a back-propagation learning algorithm. This method has the remarkable characteristic of simpler structure and control algorithms can be realized online easily.

Using a two-term fuzzy control rule-base, a fuzzy PI+PD controller is provided. The innovation of this method is that it can achieve as good performance as a three-term fuzzy controller with less computational burden. At the same time, it can also avoid such problem as the poor performance of fuzzy PI controller in transition process and static state error accumulation caused by fuzzy PD controller.

The diagram of the proposed controller is shown in fig.2. Input variables are error e and change of error Δe, related fuzzy variables are expressed as E and EC. Integral gene and proportion gene are shown respectively as Ke 、Kec and KPI、KPD. To harmonize the effect of fuzzy PI and PD, single neuron parameter self-learning function is implemented by tuning the proportion gene online.

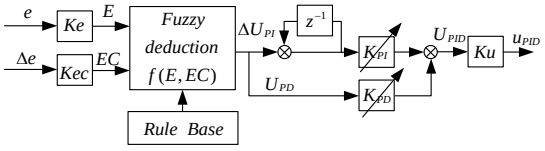

Fig. 2. Diagram of Fuzzy PI+PD Controller

4.2 Deduction of Fuzzy Rules Based on PID Control

The discrete range of input variable E and EC of the fuzzy controller can be expressed as {-N，…，-1，0，1，…，N},and the discrete range of output variable ΔU_{PI} (U_{PD}) can be expressed as {-M，…，-1，0，1，…，M}. Based on the incremental PI and PD arithmetic, the following equation can be got,

$$U_{PD}(k)=\Delta U_{PI}(k)=\gamma\left[\alpha E+(1-\alpha)EC\right] \quad (6)$$

Using equation (6), we can get the fuzzy rules automatically.

In which, $\gamma=$M/N is called adjustable gene, and weight gene

$$\alpha=|E|/N*(\alpha_2-\alpha_1)+\alpha_1 \quad (7)$$

$$0\le\alpha_1\le\alpha_2\le 1$$

Weight gene α varies between α_1 and α_2 according to the absolute value of error. α will be larger than before if input E becoming larger, and major function of the controller is reducing system error; If the input E is little than before, the algorithm will reducing α to eliminate the changing of error and then lead the system to more stable condition.

4.3 Fuzzy Deduction Method Based on Fuzzy Phase Plane

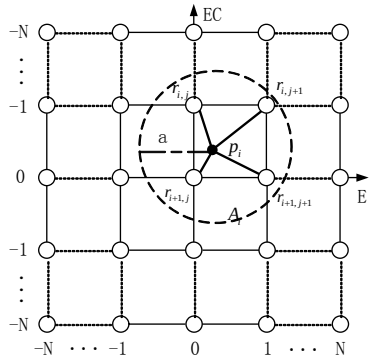

Fig. 3. Fuzzy phase plane of E-EC

To obtain the fuzzy variables E、EC(in fig.3) and carry out the process of fuzzy deduction, fuzzification is the first step. Common fuzzification methods fulfill this process with transforming the input parameters of the fuzzy controller from continuous integer to discrete fuzzy quantity, the major problem is that it can not deal with the continuous input directly and therefore the precision of the conversion can not be guaranteed. To solve this problem, a new fuzzy deduction method based on phase plane is brought forward in this paper, as shown in fig.4. Only using 4 pieces of control rules to fulfill the deduction and avoiding the calculation of membership function, this method can effectively acquire precise E and EC with less computational burden. Using this method, fuzzy deduction can be realized online easily and the efficiency of the deduction process can be improved greatly.

In fig.3,every node in the phase plane stands for a certain control rule, and which can be expressed as r_{ij} .Every point in the phase plane stands for a pair of input $P_i(E, EC)$.If P_i locate at one of the node at it happens, the output will be decided by the control rule corresponding to the node. Else, which will be the regular condition, P_i locate at a place which is not a node(shown in Fig.3), the output will be decided by the nodes in area A_i (A_i is defined as a circle with center P_i and radius a),then the output can be expressed as,

$$u = \sum_{j=1}^{l} u_{ij} m_{ij}(p_i) \Big/ \sum_{j=1}^{l} m_{ij}(p_i) \tag{8}$$

In which，

l —amount of control rules for P_i， l =1，2，3，4

u_{ij} —output corresponding to the control rule r_{ij} ;

m_{ij} —satisfaction degree of input $P_i(E, EC)$according to the j th rule;

m_{ij} is decided by following：

$$\begin{cases} m_{ij} = 1 - d_{ij} \\ d_{ij}(p_i, r_{ij}) = \begin{cases} |r_{ij} - p_i|, |r_{ij} - p_i| \le \alpha = 1 \\ 1 \quad , \text{else} \end{cases} \end{cases} \tag{9}$$

And d_{ij} stands for the Euclidean distance between $P_i(E, EC)$ and node r_{ij}.

According to equation (8) and equation (9), using only 4 control rules at best, we can fulfill the fuzzy deduction. And therefore the efficiency of fuzzy deduction can be increased greatly.

4.4 Single Neuron Tuning Algorithm

In this paper, we use single neuron to tune the proportion gene of K_{PI} 、 K_{PD} ,and then realized the parameter self-learning function. According to error back-propagation learning algorithm[5], cost function can be expressed as,

$$J = \frac{1}{2}(e^*)^2 = \frac{1}{2}(y^* - y)^2 \tag{10}$$

In which， y^* —output of reference model;

y —output of control object;

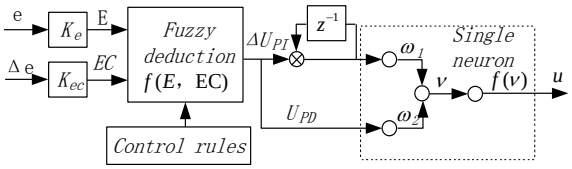

Fig. 4. Diagram of Parameter self-learning Fuzzy Controller

The diagram of single neuron is show in fig.4. ω_1 and $\omega 2$ stands for K_{PI} and K_{PD} .

The output of single neuron can be expressed as,

$$u = u_{PD}\omega_1 + u_{PI}\omega_2 = u_1\omega_1 + u_2\omega_2 \tag{11}$$

An improved BP algorithm is adopted in this paper,

$$\Delta\omega_i(k) = \text{sgn}\left(\frac{\partial y}{\partial u}\right) u_i \left(k_p e^*(k) + k_d \Delta e^*(k) + k_i \sum_{j=1}^{k} e^*(j) \right) \tag{12}$$

And $\Delta\omega_i = \omega_i(k+1) - \omega_i(k)$, $\Delta e^*(k) = e^*(k) - e^*(k-1)$

Using the equation (11) and equation (12), we can get the output of the fuzzy controller.

5 SIMULATION AND EXPERIMENTAL RESULTS

Technical specifications of the PMSM drive system used in this paper are shown in Table I.

5.1 Simulation results

To verify the proposed adaptive system, a full discrete SIMULINK model is built. The vector control scheme is programmed with 100 us sample time. We do some simulation comparisons between traditional PI speed controller、PI speed controller with speed differential

coefficient minus feedback and parameter self-learning fuzzy speed controller proposed in this paper.

Fig.5 is the Starting process comparison of speed response.

Torque disturbance is added to system at the end of 3rd second, and load change from 15Nm to 45Nm, speed response is shown in fig.6.

Curve 1 stands for the speed response of PI controller, Curve 2 stands for the speed response of PI speed controller with speed differential coefficient minus feedback and Curve 3 stands for the speed response of fuzzy controller.

From fig.5 and fig.6, we can see that fuzzy regulator has the best performance compared to the other two speed regulators.

TABLE I TECHNICAL SPECIFICATIONS OF THE PMSM DRIVE SYSTEM

Parameter	Specifications
Motor type	PMSM
Rated speed/peak speed(rpm)	1500/6000
Rated torque/peak torque(Nm)	115/180
Rated power/peak power(kW)	18/28
Input voltage(V)	320~380
Stator resistance (Ω)	0.039
Stator induction(H)	0.0085
Pair of poles	4

5.2 Experimental results

An experimental system based on DSP has been constructed in order to verify the proper operation of the proposed technique. This system includes TI's DSP － TMS320F2407A as central control unit, intelligent power module (IPM) as the power switch unit, and a 18/28kW PMSM as actuator.

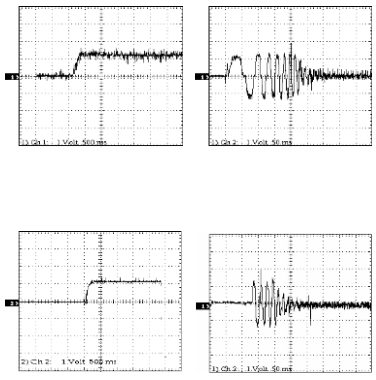

Fig. 5. show the speed and stator current response for the motor start from 0 to 1000rpm with no load.

Fig.5 is the speed response of PI regulator, and the tuning time Ts＝280ms.As a comparision,fig.5 shows the speed response of fuzzy regulator, we can see that the tuning time for the proposed algorithm is Ts＝150ms.From the results we can draw the conclusion that the tuning time for speed and current response has been reduced remarkably using the proposed fuzzy algorithm.

6 CONCLUSION

Using two-term fuzzy control rule-base, fuzzy PI+PD controller can achieve as good performance as a three-term fuzzy controller with less computational burden. A novel fuzzy deduction method based on fuzzy phase plane is provided. The control parameters are self-tuned by a single neuron together with a back-propagation learning algorithm, which extends its application scope in the Electric locomotive.

REFERENCES

[1]P. Pillay, R. Krishnan,"Modeling of permanent magnet motor drives,"IEEE Trans on Ind. Electron, Vol. 35, no. 4, pp. 537-541, Nov. 1988.

[2]Jang-Mok Kim,Seung-Ki Sul,"Speed control of interior permanent magnet synchronous motor-drive for flux weakening operation," IEEE Trans. on Industry Applications, 1997,33(4),pp.43-48

[3]Han-Xiong Li, H.B.Gatland. "Conventional Fuzzy Control and Its Enhancement," IEEE Trans. on systems, Man and Cybernetics-part B:Cybernetics,1996,26(5),pp.791-797

[4]K.J.Astrom,T.Hagglund,C.C.Hang,andW.K.Ho,"Automatic tuning and adaptation for PID controllers A survey," IFAC J.Contr.Eng.Practice,vol.1,no.4,pp.699-714,1993

[5]Junghui Chen,Tien-Chih Huang,"Applying neural network to on-line updated PID controllers for nonlinear process control," Journal of Process Control,pp.211-230,2004

[6]Ching-hung Lee,Yi-Hshiung Lee,"A novel robust PID controller design by fuzzy neural network," Proceedings of the American Control Conference.May8-10,2002,pp.1561-1566.

[7]Qiang Sheng,Zhuang Xianyi,Wang Changhong, "Design and implementation of an adaptive PID controller using single neuron learning algorithm," Intelligent Control and Automation,2002.Proceedings of the 4th World Congress on Vol.3,June10-14,pp.2279-2283.

[8]Gang Shi, Yuanwei Jing, Aidong Xu and Jia Ma, "Study and Simulation of Based-fuzzy-logic Parallel Hybrid Electric Vehicles Control Strategy," Intelligent Systems Design and Applications, 2006. ISDA '06. Sixth International Conference on Vol.1, 16-18 Oct. 2006 pp.280-284.

[9]Li, J., Zhou, S., Xu, S., "Fuzzy Control System Design via Fuzzy Lyapunov Functions," Systems, Man, and Cybernetics, Part B: Cybernetics, IEEE Transactions on Volume 38, Issue 6, Dec. 2008 Page(s):1657-1661.

Research on Analysis and Evaluation System of Big Data Cloud Computing Information Security

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Abstract: In the global context, China's development speed is obvious to all, and it is also among the best in the world. This development speed has made great progress in China's science and technology. Cloud computing and big data environment are the use of contemporary society. A very wide range of information technologies, these two technologies create more convenient conditions for people. In this context, the security of information storage and dissemination has become a topic of great concern. For individuals and large enterprises, once important information data leakage incidents occur, personal information security and business secrets will be Such information security poses a huge threat, and enterprises are also vulnerable to economic losses, affecting their healthy development. Therefore, information security technologies in cloud computing and big data environments have entered people's field of vision. The importance of information security technology is self-evident. Individuals and enterprises of different natures should scientifically select and apply information security technologies to enhance them. Information security.

Keywords: Cloud computing; Big data; Environment; Information security technology

1. INTRODUCTION

Data has penetrated into every industry and business function area today and has become an important production factor. In recent years, big data has been widely used in the Internet and information industries. At the same time as the era of big data, cloud computing is also an emerging computing service, which is rapidly emerging in all walks of life due to its advantages of convenience, economy and high scalability[1].Users delegate computing tasks and data to cloud service providers, greatly reducing the burden of user computing and storage[2]. At the same time, however, there is also the risk that users lose control of their own computing tasks and data. However, from the perspective of user information protection in China's information industry, there is a certain imperfection in information protection, pending data protection algorithms. Improve to adapt to the promotion of cloud computing in the era of big data.

2. ANALYSIS OF THE STATUS QUO OF INFORMATION SECURITY MANAGEMENT IN CHINA

The advent of the era of big data has made the important role of data more and more prominent, and the risk of data being stolen due to the high sharing of data, the data security issue is extremely wide, and it is small to personal privacy[3].To national security, it has gradually become a social issue.At present, China generally lacks information security awareness, which causes data information to be stolen by various network attacks, resulting in serious social information security problems[4].Despite this, many areas of China do not pay much attention to information security management, and thus the problem of insufficient information confidentiality is widespread. At present, under the clamping of cloud computing technology, information security work has received effective technical support. Relevant units or industries can rely on cloud computing technology to build a high-security data encryption space to provide a safe operating environment for industry development. At present, China's information security market is rapidly increasing in value. Of course, as cloud computing technology is still developing (see Figure 1). The effective implementation of information security management in all walks of life in China still has a long way to go[5].

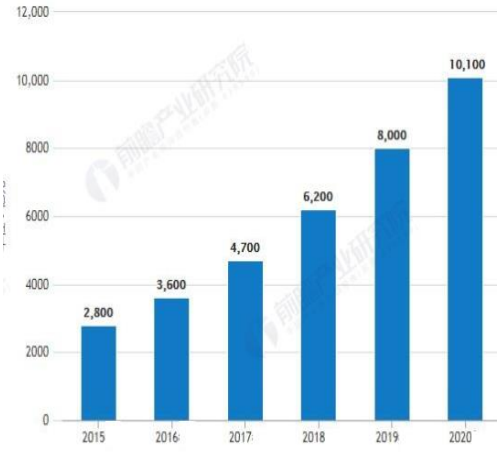

Figure.1 Scale of China's big data industry development in 2015-2020 (100 million yuan) (Source: Public Information)

3. ANALYSIS OF INFORMATION SECURITY TECHNOLOGY UNDER CLOUD COMPUTING AND BIG DATA ENVIRONMENT

3.1 Content-aware encryption technology

For users or enterprises, there are many types of information, and the encryption requirements of these information are different. Therefore, there is a need for a technology that can select an appropriate encryption method according to specific content, and automatically encrypt the content of the private information. Technology is content-aware encryption. The characteristics of the technology are as follows: (1) to achieve automatic encryption of content, according to the content of the user to transfer data, select the appropriate encryption technology, and set an automated password to avoid information leakage; (2) the encryption technology is mainly using a computer Software implementation can be easily controlled in a variety of ways. At present, the development of content-aware encryption technology has been relatively mature, and has been widely used in many fields. Because of its high encryption security, it can be used in the fields of big data and cloud computing to further ensure the security of information for subsequent[6].The development of information technology provides a strong guarantee.

3.2 format encryption technology

On the basis of big data environment and cloud computing technology, information security technology must do the encryption process data, format, content, etc. without any change, which requires the application of format-protected encryption technology to enhance the information perception. When applying format-protected encryption technology, the most critical part is to complete the modular encryption algorithm for data, to ensure that a large amount of information can be encrypted, and to enhance the security of information transmission. This encryption technology can not only improve the transmission of big data. Speed and security also ensure that the corresponding format does not change during the transmission process, improving data usability. Although the scope of information encryption technology applied in contemporary society has been expanding and it has achieved good application results, there are still some problems in the actual encryption of information data. For example, if software cloud computing fails, people can only see it directly. Log in to the account password, which will leave "opportunities" for the criminals, resulting in data security risks. In order to continuously improve the level of information security technology, it is necessary for scientific and technical personnel to continuously develop and utilize cloud computing technologies and big data environments, enhance encryption technology, and ensure the security of information data.

3.3 Data Encryption Technology Analysis

For all walks of life, information security is to ensure that its important data information is in a safe state without being deliberately stolen, falsified and destroyed, thus providing an information security environment for the development of all walks of life. For information security, the direct means is to encrypt relevant key data, so that effective information can not be obtained even if it is stolen, which can significantly reduce the security risks of industry and society. In this respect, the significance of encryption is to effectively protect important information of all walks of life or individuals. For data encryption, there are two main types of public encryption and private encryption. The former uses public key encryption and the latter uses key encryption. Through this encryption form, the security protection status can be improved according to user requirements, and cloud computing technology is further used to further enhance the security level of encryption, thereby effectively protecting the protection level of important information such as privacy, and providing high information security for users or various industries.

4. ANALYSIS OF DATA INFORMATION SECURITY RISKS

4.1 Establish information security technology management mechanism

(1) Improve relevant laws and regulations, discuss some common problems and strategies of information security technology, provide legal protection for the development of big data and cloud computing technology, and can implement legal compliance in practical applications; (2) Establish data transmission specifications, strictly follow the rules to restrict user behavior, so that they can comply with relevant usage methods and avoid information security problems caused by human factors.

4.2 Cloud computing and big data environment risk screening analysis

For data security protection, an important aspect is to improve the security risk identification capability, which requires the clamping of security risk protection technology. For security risk prevention technology, the key is the screening of security risks. At present, the main task of screening for security risks is to build a knowledge base and use manual analysis to screen. In this process, the learning of screening rules and the screening of risk factors are clarified to optimize the process. Through the above methods, the practical value of risk screening can be improved on the basis of improving the risk prediction ability. Of course, due to the uncertainty of the quantity and form of information risks, the acquired data information is inaccurate and incomplete, which seriously affects the encryption meaning of the data information. Of course, under the basic framework of cloud computing, relying on the theory of roughness can reduce the structural and formal changes in the transmission of data information, resulting in difficulty in obtaining data information, thereby improving security risk protection and real information acquisition capabilities in data transmission. Realize the role of

information security protection in cloud computing and big data environments.

4.3 Establish an intelligent system for information security problem identification

(1) The automatic identification of information security problems, by analyzing the abnormal behaviors in the current system, reminding or stopping the suspected intrusion behaviors, can effectively block targeted intrusion behaviors; (2) intelligently analyzing information security issues, Collect relevant information about information security risks, you can understand the modules that are vulnerable to attack, find out the vulnerabilities and deficiencies in the system, and then ask the information security technicians to carry out targeted repairs, which can save manpower and material resources and improve information. The efficiency of repairing security issues minimizes corporate and personal losses.

5. CONCLUSION

In the context of the information age, information security has become a hot topic of concern to all sectors of society. Generally speaking, the comprehensive value of enterprise information is much larger than that of individuals. Therefore, the level of enterprise information security also determines The development of the company's benefits, even survival, must use scientific and efficient information security technology to ensure that a large number of confidential information of the enterprise will not be leaked, will not be obtained by lawless elements, and improve the information security of enterprises. In this regard, it should be applied to cloud computing and big data environments. Based on this, a security protection network for information storage, transmission and reception is established to complete the encryption of information data. Several information security technologies have been briefly discussed above, and I hope to be able to inspire others.

REFERENCES

[1]Chen Zhen. Data security issues and protection in big data cloud computing environment. Electronic World, 2017 (18): 44-45.

[2]Yin Lin. Discussion on the Relationship between Big Data and Cloud Computing. Communication and Information Technology,2015(05):50-52.

[3]Wang Shiyi.Information security and protection measures for computer networks in the era of big data.Computer products and circulation. 2019(07).

[4]Huangyujie, Tang Zuoqi. Information security risk assessment based on improved Bayesian model. Computer and modernization. 2018(04)

[5]Renwei, Niu Yuxia. Information security research in the era of big data. Information communication. 2014(12).

[6]Fengwei. The Challenges and Opportunities of Information Security in the Age of Big Data. Science and technology daily. 2013(001).

The Research on the Relationship Between the Development of Farmer Cooperatives and the Leaders' Human Capital--Based on the Analysis of the Examples in Henan Province

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Abstract: As the owners of important human capital,leaders of the farmer cooperatives are the key people to lead the farmers to exploit the market,they play an important role in the development of farmers cooperatives.Accordingly,we did an analysis of the relationship between the development of farmer cooperatives and the leaders' human capital with Logistic models on samples of the available survey data of 178 farmer cooperatives in Henan,which is an agricultural province.The conclusion is:the ability characteristics and experience characteristics of the leaders of farmer cooperatives have obvious relationships with the development of farmer cooperatives,but the knowledge characterastics don't.
Keywords: Farmer cooperatives; Leaders; Human capital; Example

Research of Relationship between the Development of Farmers' Cooperatives and the Human Capital of leadership

The development of Farmers' Cooperatives has a long history. It has been considered by government and the academic community as one of the key points to deal with the issues concerning agriculture, countryside and farmers. Local governments have proposed a number of policies and suggestions in order to promote the development of Farmers' Cooperatives. Members of academic community have also conducted many researches on this problem. All above has guaranteed the prosperity of Farmers' Cooperatives in recent years. However, due to many other factors, the current situation of Farmers' Cooperatives faces some problems in business development. In order to solve these restraining factors in the way of its development, it is indispensable for us to have an overview of related researches.

Pan Jin (1997)[1] found that due to the some restraining factors such as the less desired cultural level among farmers, the development of Farmers' Cooperatives depended mainly on the education level of key persons. Zhang Renshou et al. (2003) [2]held the view that "the talents in the rural area" including the talents in production, management, social service, have composed the important factors of the development of Farmers' Cooperatives. And many talents are also the leaders of Farmers' Cooperatives. Xu Xuchu et al. (2010)[3] announced that the capability, self-calibration and resources of leadership have formed the crucial factors which impacted the development of Farmers' Cooperatives. Therefore, we can ensure that, to some extent, the development of Farmers' Cooperatives depends on the human capital of leadership. In this paper, we will discuss the relationship between the development of Farmers' Cooperatives and the human capital of leadership based on the example of Henan Province, which feeds on its agricultural development.[4]

1. RESEARCH HYPOTHESIS

The definition of human capital of leadership in Farmers' Cooperatives is based on the point of view mentioned by Schultz. With the three features of selecting capability, the experience and knowledge, the assessment of development of Farmers' Cooperatives includes two dimensions: economic performance and social performance.

1.1 Capability

Entrepreneurs make the managerial activities more effective in terms of recognizing opportunities, exploring the markets, learning innovation and managing strategy to enhance the business management performance. In this paper, we suggest that there are significant relationship between the development of Farmers' Cooperatives and the capability of leadership.

H1: The significant relationship between the development of Farmers' Cooperatives and the capability of leadership

1.2 Experience

Colombo and Grilli (2005) has proved that the former working experience of leadership has great influence on the development of enterprise. In this paper, we suggest that there are significant correlation between the development of Farmers' Cooperatives and the former working experience of leadership.

H2: The significant correlation between the development of Farmers' Cooperatives and the former working experience of leadership

1.3 Knowledge

Sluis etc (2005) studied that the factor of education

level of leadership influences the performance.

H3: The relationship between the development of Farmers' Cooperatives and the knowledge of leadership.

2. DATA COLLECTION

The subject in this paper focuses on the Farmers' Cooperatives which keep operating orderly in Henan Province. According to the location and business scope, we random check 200 of the Farmers' Cooperatives. The main subject is the person in charge of the cooperatives. The 200 surveys have been delivered between July and August in 2014 and finally withdrawn 187. 178 of them are valid which represent 89% of the total.

3. RESULT AND ANALYSIS

3.1 Reliability and Validity Analysis

Using SPSS17.0 statistical software to test the reliability of research project according with the Cronbach's αvalue; using principal component analysis and factor analysis to test the construct validity of research project .

Reliability test is not necessary for knowledge and experience since the measurement indexes data are objective, but should be done on capability because its mainly subjective measurement index. Test results are shown in Tab.1, the factor loads are all over 0.5, which means that the validity of measurement items are acceptable.

Table 1 Human capital factor analysis of leadership of farmers' cooperatives

Test items	Load factor		
	F1	F2	F3
The ability to recognize opportunity	0.789	—	—
The ability to exploit market	0.723	—	—
The ability to learn knowledge	0.705	—	—
The ability to teach knowledge and technology	0.634	—	—
The ability to set up social network	0.673	—	—
The ability to innovate	0.585	—	—
The experience are social position employment	—	0.791	—
Migrant working experience	—	0.648	—
Age	—	0.604	—
Education	—	—	0.762
Retraining degree	—	—	0.711

Reliability test is not necessary on the "cooperative economic performance" since it is measured on the basis of fact. The Cronbach's αvalue of "cooperative economic performance" is 0.657, αvalues of all measurement items are all over 0.5, suggesting its high reliability. We can see the factor analysis results in Tab.2, factor loads are all over 0.5, which means that the construct validity of measurement items are acceptable.

Table 2 Factor analysis of the development of farmers' cooperatives

Test items	Load factor	
	F1	F2
Sales growth	0.718	—
Profit growth	0.635	—
Cooperatives reputation	—	0.597
Cooperative member satisfaction	—	0.643
Increase in the number of members to participate	—	0.711

3.2 Hypothesis Analysis

The paper takes capability, experience and knowledge as observation variables according to the above related analysis, binary Logistic retrogression was conducted on the survey date using SPSS17.0.

3.3 Test Results Analysis

(1)The development of Farmers' Cooperatives is positively correlated with the capability feature of leadership

Table 3 Logistic model regression results of the development of farmers' cooperatives and human capital of the leadership

Model variables	Coefficient	Wald value	Exp(B)
F1	0.912**	5.587	2.476
F2	0.921**	4.432	2.498
F3	0.009	0.001	1.010

Note: ** means statistical significance at the level of 5%

Model regression results show that the capability feature of leaders is statistical significant at the level of 5%, which means that the stronger the capability of leaders is, the better the development of cooperatives will be. Meanwhile, capability feature owns a larger correlation coefficient with the four variables of ability to recognize opportunity, to exploit market, to learn knowledge and to set up social network, the correlation coefficient with variables of ability to teach knowledge and technology and to innovate is small, all suggesting that the former four variables are important factors to decide the capability feature of leaders.

(2)The development of Farmers' Cooperatives is positively correlated with the working experience feature of leadership

Model regression results show that working experience feature of leaders is statistically significant

at 5% level, which means that the working experience directly effect the development of cooperatives. Meanwhile, three variables of social position employment, migrant working experience and age are important factors that can decide the experience feature of leaders.

(3)No significant correlation can be found between the development of Farmers' Cooperatives and the knowledge feature of leadership

Model regression results show that knowledge feature of the leaders was not obviously considered. Through actual investigation, we found that 56.4% of the leaders only have high-school degrees or below; only 32.1% have attended related trainings of farmers' cooperative organized by government. One possible explanation is that many talents in the rural area learned knowledge from working, not formal school education. The paper set the knowledge measurement indexes as formal academic education and retraining experience, so what needed to be further considered is the way to embody the concept of learning from working, an index hard to be measured. Meanwhile, many farmer cooperatives are all in start-up stage, but knowledge can't play a big role for the enterprises in start-up stages.

4. CONCLUSION AND IMPLICATIONS

Corresponding researches have been conducted in the 178 farmers' cooperatives in Henan, using empirical evidences with Logistic model to confirm the relationship between the development of farmers' cooperative and the human capital of its leadership. Conclusions: the development of farmers' cooperative is positively related with the capability and experience of its leadership, but not obviously related with knowledge. Among which, important measurement indexes of the capability include the ability to recognize opportunity, to exploit market, to learn knowledge, to teach knowledge and technology, to set up social network, to innovate and other abilities. Important measurement indexes of the experience are social position employment, migrant working experience and age. Based on the above conclusions, to improve the business development performance, the following suggestions are put forward: the improvement of human capital of leadership should be considered as an important point of its development; governments and governing units at all levels must create favorable conditions to improve the human capital; leaders of farmers' cooperative also need to improve their human capital in a positive way.

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REFERENCES:

[1]Jin Pan,Restrict factor analysis of economic behaviors of China's rural cooperatives, Issues in Agricultural Economy, 1997 (8): 2-7.

[2]Ren-Shou Zhang, Yuanjie Cai, A big innovation of agricultural management system--investigation and thinking on rural specialized cooperative organization in Zhejiang,Issues in Agricultural Economy, 2003 (9): 63-66.

[3]Xu-Chu Xu, Bin Wu, The effect of government mechanism on rural specialized cooperatives--based on the empirical analysis of 526 rural specialized cooperatives in Zhejiang province, Chinese Rural Economy, 2010 (5): 43-55.

[4]Xiao-Gang He, Entrepreneur ability, organization ability and the enterprise performance, Shanghai: Shanghai University of Finance and Economics Press, 2006.

Exploring the Mixed Teaching Mode of Mechanical Design Course Based on Structural Problems

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Abstract: The defective structure problem is effectively applied to the teaching reform of the Mechanical Design course. The research establishes the "poor structural problem" model suitable for mechanical students, and forms a high level learning of online and offline autonomy with "problem" as the core, training students in the process of solving problems, including planning, inspection, monitoring, testing and other processes, highlighting the "poor structural problems" in training students to analyze, judge and solve practical problems. In practicing, students are the main bodies, and the teacher-led mixed teaching mode is carried out in order to provide reference for the enthusiasm of students in vocational colleges.

Keywords: higher vocational education; poor structural problems; independent learning; mixed teaching

The "Basis of Mechanical Designing" course is the main course of mechanical engineering, and a compulsory course for engineering and technical personnel. This course is the beginning of understanding and mastering engineering design calculation. It has rich theoretical knowledge and methods which are essential to solve practical engineering problems.

In order to improve market competitiveness and attractiveness in higher vocational education, the primary task is to improve the quality of education. In recent years, various higher vocational colleges have carried out a series of reforms in terms of personnel training programs and curriculum systems. However, the quality of employment after graduation is not very good. The industries that the graduates engaged in are not match the majors they studied. There is a big gap between education and economic production. The quality of higher vocational education is worrying. The reason is mainly the traditional indoctrination teaching method, which is not the way that students in a passive position. The formation of engineering literacy and classroom thinking are not enough, and the students' innovation consciousness and engineering concept cultivation insufficient training. In addition, due to the poor quality of students in higher vocational colleges, the interest and enthusiasm of learning is quite low, which causes the students in vocational colleges to be seriously out of touch with enterprises.

In order to train the talents who have the ability to learn the independently, practice and innovate, and to be good at thinking, analyzing and solving problems, to reform the curriculum teaching model is absolutely necessary. Achieving the effective connection between the talents trained in vocational education and the needs of the society, economic and social development, and truly achieving the goal of seamless connection between industry and education, employment zero distance, and students and employers are urgently needed to be solved.

Course teaching is a key link to improve the quality of teaching. It is a direct carrier and platform for teaching implementation and communication with students. At present, due to the students' lack of learning initiative and teachers' weak teaching ability, additionally, the teaching methods are single and outdated, and classroom content preparation and design are inadequate, the atmosphere of the classrooms is dull and lack of vitality. Therefore, by reforming the curriculum system, teaching content, teaching methods, teaching methods, etc., we form a new mode of vocational education teaching that is different from exam-oriented education and subject education, stimulating the classroom vitality, giving the students a new look, and let them be interested in investing in the classroom. Let them have problems to think and to solve in order to improve their professional ability. This is the key to improving the quality of vocational education, attracting students, and inspiring classroom vitality.

With the continuous deepening of education reform, the research of mixed teaching mode has received more extensive attention. The author believes that the problem of structural deficiencies and the mixed teaching model are combined to explore teaching reform, subverting the old traditional classrooms, breaking the indoctrinated teaching model, and creating an independent, efficient and energetic classroom. In this way, through the solution of structural problems, students can develop the ability to solve practical problems and promote the improvement of students' comprehensive quality.

1. THE CONNOTATION AND INTRODUCTION OF

STRUCTURAL PROBLEMS

The ill-structure problem is an open-ended or unanswered question, with multiple criteria for evaluating solutions, and is a poor problem-oriented approach to teaching. It should be pointed out that the degree of structural poorness of structural problems are vary. The pedagogy is characterized by changing the teaching mode in which the teacher-led teaching and passive learning are used in the teaching process. Instead, the teacher sets the structural problem in the teaching content. In the process of student learning, the groups investigate and analyze the problem. And inquiry, focusing on cultivating the ideas and processes of problem solving in the process, cultivating students' ability to analyze and solve problems, including planning, inspection, monitoring, testing, etc., and finally form a teaching mode of self-learning consciousness and ability. Through this inquiry process, students are guided to learn relevant knowledge points spontaneously and enhance students' practical ability to solve problems.

2. BASED ON THE USE OF PROBLEM-ORIENTED EDUCATION AND THE STATUS QUO

In the curriculum of traditional education, most of the problems have not been modified, taken from the original ecology, and belonged to the Well-structure problem. The condition is clearly defined, the solution is determined, and only a limited number of rules are applied. According to the principles, you will get a definitive answer. In the teaching process, colleges and universities generally set simple questions about knowledge, but these problems are clear and the problem is solved. However, the problem of determining the answer is simplistic, which is not conducive to students' exploration, and has weak ability to acquire advanced knowledge and solves practical problems and work situation problems. This has caused students in vocational colleges to seriously stagnate with the society and enterprises, resulting in a disconnection and difficulty in achieving integration of production and education.

Teaching based on "poor structural problems" is widely used in education field aound the world, especially in medicine, biology, engineering, and management. The survey shows that in some western science and engineering schools, the proportion of courses based on "destructive structural problems" is quite large. In China, the teaching method based on "defective structure problems" has also been received extensive attention. Some domestic research results show that the introduction of the "poor structure problem" teaching method can effectively improve the teaching effect in domestic teaching, and has certain advantages compared with the traditional teaching method. Researchers have also adopted the introduction of the "poor structure problem" teaching method in the domestic secondary education, and have received good results. Poor Structural Problems due to their own uncertainty, students in the process of thinking about problems, through brainstorming strategies. It will lead students to explore and actively acquire knowledge.

3. THE "POOR STRUCTURAL PROBLEM" INTRODUCED INTO THE CLASSROOM PATH DESIGN

Vocational colleges should actively provide students with the opportunity to analyze and solve "defective structural problems" and actively build an online course learning platform. Course designers actively integrate structural problems into teaching materials. Teachers should fully realize the role of "poor structural problems" in the employment and development of students. Teachers should explore the use of such questions to improve students' ability to analyze and solve practical problems.

With the construction and promotion of campus informationization, network coverage and network bandwidth continue to be improved, students participate in hybrid learning is becoming a reality. Mixed learning is frequently used in vocational education. How to effectively design structural problems and apply mixed learning theory to teaching has become an urgent problem to be solved.

(1) Introducing a mixed teaching model based on "poor structural problems" into classroom teaching.

In the process of teaching in the classroom, we designed the "poor structure problem" and broke through the passive way of "teacher speaking, student listening". Applying the design "poor structure problem" to instructional design, classroom teaching, teaching evaluation, create an open learning environment, changing teaching and learning methods, cultivating students' ability to analyze problems and solve problems, and improving teachers' knowledge level and control classroom ability to promote classroom teaching reform.

Different problems often have different solutions. When solving problems, students are required to have a certain amount of knowledge. At this time, they need to use the online learning platform to give full play to the students' individuality and provide students with online knowledge needs for exploring problem solutions. Teachers act as guider and supporter here. The two learning modes are integrated to achieve the goal of reducing costs and improving efficiency.

(2) Mixed teaching of "structural problems" is applied to classroom teaching objectives and content.

Each core contents of the course are sorted out, and each part extracts a number of "poor structural problems". The teaching time of the course is divided into two parts: theoretical teaching and practical teaching. The theoretical teaching time is used to solve the problem-based learning by means of teacher-led teaching and group discussion, especially based on the study of "bad structural problems". In the practical teaching time, students take the problem into the practice teaching place to "do the middle school, learn in the school", verify the theory, refine the theory, and

summarize the conclusion.

For example, designing a shaft and analyzing the fatigue limit stress of different groove sizes of the shaft, the size of the different grooves, has a great influence on the overall strength of the shaft. Through the face-to-face teaching and online software analysis of teachers and students, it has an intuitive effect.

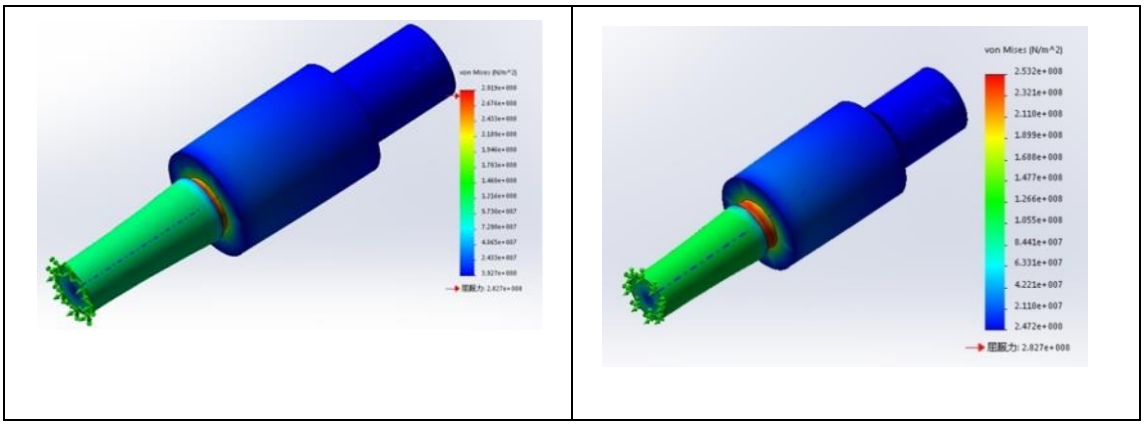

Figure 1 Fatigue limit stress of different groove sizes

(3) The "poor structural problem" model is applied to classroom teaching methods and means.

Apply the "question-based" teaching model to classroom teaching design and process, integrate curriculum teaching resources, analyze classroom teaching objectives, and determine key points and difficulties in classroom teaching. It is important to design classroom teaching "bad structure problems" carefully, collect teaching materials, design task books, and prepare teaching materials. The practical curriculum is mainly hands-on. The students follow the practical project and enter the practical teaching site in groups to carry out calculation, design, and even production, assembly, and trial movement. After a cycle of tasks, the materials are collated and analyzed, integrated or statistically processed. Summarize the report, and then exchange presentations and mutual reviews between groups to improve the level of metacognition. Writing a summary report must apply theoretical knowledge for analysis and discussion. Teachers provide guidance and assistance in all aspects of observation and practice, including practice plans, practice records, and data processing. Through the course website, we provide resources and method guidance, communication and discussion platforms, and effectively apply multimedia technology.

Special attention should be paid to the formation of teacher design problems - students ask questions - students solve problems after class - class analysis questions - teacher summary and other teaching links. Emphasize the role of meta-knowledge in solving problems of poor structural problems. To achieve structural problems, learners use metacognitive techniques to monitor their problem-solving processes, reflect on their problem-solving goals and resolution processes, and automatically supervise, control, and master their cognitive processes. And use existing experience to analyze and summarize the current situation and seek strategies to solve the problems. To ensure that your actions are toward the desired target state, the execution of the plan must be monitored and adjusted.

(4) Comprehensive evaluation of students based on questions.

From the students' ability to understand the basic problems in the analysis and design of mechanical institutions, to grasp the mechanical analysis of mechanical parts and the innovative design and research strength of research institutions, teaching evaluation focuses on ability evaluation. Formulate the "question-based" learning process evaluation index system and implement process evaluation; analyze the shortcomings and causes of the existence of teaching in the course summary, study the effectiveness of the "problem-based" method, and propose corresponding countermeasures.

4. THE IMPLEMENTATION OF THE MIXED TEACHING OF THE "MECHANICAL DESIGN" COURSE

(1) Organization of teaching resources

Take mechanical students in higher vocational schools as the subjects of teaching, setting up structural problems, assisting mixed learning models, combining online learning methods with classroom learning methods, and combining teacher-led activities with student subject participation. The traditional learning method is combined with modern network means in the classroom teaching process.

Analyze the contents of each module of the "Mechanical Design" course, designing a structural problem for each knowledge point, determining the teaching objectives and teaching content, and exploring a mixed learning model (face-to-face teaching and online teaching, distributed according to a certain proportion) to organize teaching. The qualitative and quantitative evaluation of the teaching effect is carried out to sum up the mixed teaching mode based on the "structural bad problem" based on the individualized learning of college students, in order to achieve the teaching goal more effectively and

improve the students' independent learning ability and innovation ability.

(2) Implementation of teaching

Take the classroom teaching reform of "Mechanical Design" as the link, designing learning points according to the needs of key positions of enterprises, consolidating the problem of bad structure and realizing the effective matching of talent supply and demand. Establish tasks and extensions in the typical working process of the "Mechanical Design" course, and realize the expansion of innovation capabilities. The main role of teachers in the design of "bad structure problems" when teachers discuss this "bad structure" problem is to guide students, correct them in time, and encourage students. Then improve the curriculum construction plan, establishing the curriculum quality standards and the construction of the combination of engineering and learning curriculum system, preparing the teaching plan; deepen the reform of teaching methods, teaching conditions, teaching assessment and evaluation, and enhance the effect of "L".

Based on the "problem", design "defective structure problem" in the "mechanical design" classroom teaching design and process, integrate curriculum teaching resources, analyze classroom teaching objectives, determine problems in classroom teaching, carefully design classroom teaching problems, collect and prepare teaching data, design task book, teaching based on poor structural problems, characterizing, solving, and evaluating solutions. Through the reflection and research on the teaching evaluation work of the college, discover and analyze the problems existing in the work, take improvement measures, and formulate improvement plans. The implementation of the phased reform results will be continuously implemented, demonstrated, revised and improved.

For example, when explaining the choice of ε coincidence degree in the continuous transmission condition of the involute gear, let the students think about how the designer can effectively select the numerically poor structural problems according to the bearing capacity, the stability of the mechanism and the actual working conditions. On the basis of the information, we will actively answer questions in a multi-faceted manner by using online course resources. For example, what kind of material is chosen as the material for the high-speed rotating spindle? This needs to consider the processing technology of the material, the price of the material, the working conditions and other parameters. In the calculation of fatigue strength, the selection of the ultimate stress and related coefficients, etc., can also be discussed by means of online computer-aided design. The design of such questions encourages students to actively discuss and think, that will create an open learning environment, cultivate students' ability to analyze problems and solve problems, and improve teachers' classroom control ability, activate classrooms, and promote classroom teaching reform.

Another example: slipping during the belt drive process, correcting the reason? We know that there are two situations: the elastic sliding and the slip of the belt drive, and the actual factors and working conditions of the situation are analyzed. During the belt drive process, the belt is damaged. What is the cause and how to deal with it? Is the transmission of the gear drive inaccurate? What is the reasons for the poor lubrication of construction machinery equipment (excavator) and solutions? How to fix the part on the shaft? And so on, the problem is set effectively.

Based on the "Mechanical Design" course, the "Structural Problems" will be integrated into the teaching design to carry out teaching reform, and modern teaching tools and high-quality resources will be used to assist the teaching, so that students will learn how to think independently and solve problems, thus enhancing students' interest and integration ability. The learning process is more proactive, and thinking is more critical.

5. CONCLUSION

Through practicing, the mode of exploring the hybrid learning method based on "structural bad problem" into teaching is applied in the teaching of Mechanical Design. The effectiveness of the mixed learning mode is tested by comparing the learning effects. In this way, in the process of classroom teaching, the autonomy of students' learning is highlighted, and the students' interests and vitalities are stimulated. Study the operation modes of independent learning, cooperative learning, and inquiry learning in the basic and theoretical courses with the "bad structural problem" model as the mechanism. Applying the "defective structure problem" model to the effectiveness of engineering courses, it solved the contradiction between the rich and abstract teaching content of engineering courses, limited teaching time, shortage of practice sites, and low teaching effect, which in turn leads to school teaching goals and corporate positions. The contradictions required to achieve the unity of the academic and applied nature of the basic theory curriculum, in order to cultivate students' self-learning ability and practical innovation ability.

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reform research project “Exploration and Practice of Bilingual Teaching Mode of Higher Education Joint Project——Taking Engineering Drawing of Electromechanical Integration Technology as an Example”.

REFERENCES

[1]Gong Houxian. Based on the project-driven curriculum reform of Mechanical Design Foundation [J]. Vocational and Technical Education, 2011, 32 (17).
[2]Pan Wangui, Lin Haibo. Exploration on the New Path of Training High-skilled Talents in Higher Vocational Colleges[J]. Vocational Education Forum, 2013(18): 26-28.
[3]Jiang Yuhua. A Preliminary Study on the Teaching Reform of the Course Mechanical Design Foundation[J]. Journal of Weifang University, 2011, 11(4): 129-131.
[4]Lin Haibo. Classroom teaching around structural problems [J]. Education and Occupation, 2017 (8).
[5]Yang Chengyin, Yang Bao, Yang Fan. “Understanding Structural Problems”: The Structural Orientation of Problems That Should Be Neglected in Middle School Science Textbooks[J].Journal of Educational Science of Hunan Normal University,2013,12(5).
[6]Kong Weihong, Gao Ruili. Teaching Reform of PBL and Colleges and Universities[J]. Journal of Guangzhou University (Social Science Edition), 2003, 2(4): 77-79.
[7]Peng Jie, Guo Huaizhong. Analysis and discussion on the introduction of junior high school physics teaching with structural problems [J]. Physics Teacher, 2015, 36(4): 45-47.
[8]Han Pengcheng, Xu Zuoying. Solution Strategy of Structural Problems in Biology Teaching[J].China Educational Technology & Equipment,2014(8):98-99.