Construction of Education Evaluation System Based on MFA under Big Data Technology

Bo Dong

Hengdian College of Film & Television, Dongyang 322118, Zhejiang, China
Corresponding author e-mail: qikantu@163.com

Abstract.
Aiming at the problem of imperfect management evaluation system in current college education, which lacks of scientific and systematic, big data technology is uitilized to design a college education management evaluation system based on the combination of MFA and BP neural network. The college education evaluation model and MFA analysis method based on BP neural network are used to select educational evaluation indicators from students' basic information, and then the evaluation factors are determined by this model, and corresponding coping strategies are given. The results show that after conducting a questionnaire with 100 teachers, 75% of them are very satisfied, 20% of them are relatively satisfied, and only 5% of them are not satisfied. Comprehensive analysis shows that most teachers have high satisfaction with the system, indicating that the college education evaluation system designed in this paper can effectively realize the evaluation of college education, improve the scientific and systematic obviously, and further improve the management system.

Keywords: *big data; MFA multi-factor analysis; college education evaluation; BP neural network; evaluation factors*

1 INTRODUCTION

With the continuous development of science and technology in our country, cultivating high-quality talents is of great significance to the development of national science and technology. As the cradle of cultivating high-quality talents, colleges and universities strengthen the comprehensive evaluation of student education in colleges and universities, which will help improve the management level of colleges and universities and cultivate more high-quality talents. As a result, some colleges and universities at home and abroad have also begun to realize the importance of student education evaluation, and continue to carry out college education evaluation work. For example, Australia pays attention to the self-evaluation of college students and implements an independent student self-management system; the United States is extremely Pay attention to students' self-education ability and allow students to participate in school management on an equal footing; Chinese universities emphasize on allowing students to actively participate in the evaluation work, paying more and more attention to the education management evaluation system, and constantly improving the education management evaluation work. These

traditional college education evaluation systems are only researching and improving them on the basis of evaluation theory, which cannot truly reflect the comprehensive quality of students, and they cannot be evaluated in all aspects. Therefore, this article designs and develops an MFA-based college education management evaluation system to effectively evaluate students and provide a reference for improving the quality of college students, thereby cultivating college talents.

2 OVERALL SYSTEM DESIGN

2.1 *System Architecture*

In order to facilitate the maintenance and modification of the system, this paper adopts B/S architecture to construct the college education management evaluation system based on MFA. The system is mainly divided into four layers, namely user application layer, business evaluation layer, data service layer and data layer respectively. The user application layer can also be called the user interaction layer, where users make requests, meanwhile users utilized an AJAX engine to process requests and pass data [1]. The business

evaluation layer is responsible for establishing the factor set of evaluation indicators, uses the analytic hierarchy process to analyze students' evaluation factors, and uses the BP neural network model to evaluate students' evaluation factors of students [2]. The data service layer is responsible for providing a switching channel for data exchange between the database layer and the business logic layer. The data layer holds all the data of evaluation model and is the data source of other layers [3].

2.2   *System Process*

The process of the MFA-based college student education management evaluation system includes seven steps [4], as shown in Figure 1. Firstly, users use the system to start the evaluation, and the system is used to obtain students' basic information [4]. Secondly, the system is used to establish evaluation model, obtain and understand the evaluation factors, and select the evaluation factors that are consistent with the students. Moreover, the weights of evaluation factors are obtained, and the evaluation analysis model is integrated. Finally, the BP neural network algorithm and the correlation factor model are utilized to evaluate the students, thus the evaluation results are obtained and countermeasures are given based on the results, and then the evaluation results and countermeasures are fed back to users [5].
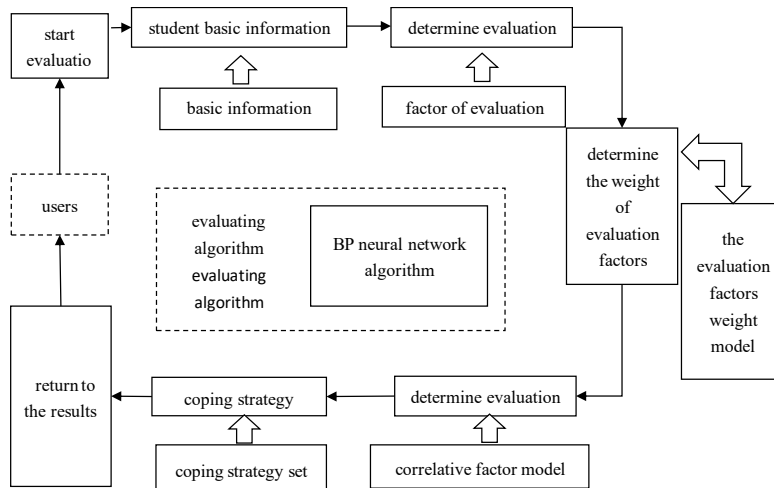

Figure 1 System flow chart

3   CONSTRUCTION OF COLLEGE EDUCATION EVALUATION MODEL BASED ON BP NEURAL NETWORK

3.1   *BP Neural Network Evaluation Model*

BP neural network is mainly composed of data input layer, data processing layer (hidden layer) and data output layer. In this paper, the forward calculation and error backward transmission of BP neural network are used to judge students' evaluation factors.

Forward calculation: set i to represent the hidden layer neuron, j to represent the input layer neuron, W_{ij} to represent the connection weight of the two, where i =1,2,3,4,...,m; X_{jp} represents the j th input value of p th sample; θ_i represents the threshold of the hidden layer neuron; f represents the activation function of the hidden layer neuron; and a, b, c represent adjustable parameters, and the value is 1[6]. The input and output formulas of the hidden layer neurons are shown in

equations (1) and (2), respectively, and the neuron output of the output layer is shown in equations (3)[8].

$$\begin{cases} R = \begin{bmatrix} i_{i,j} \end{bmatrix} arm \quad i = 1,2,...,j;\ j = 1,2,...,m \\ \qquad\qquad r_{ij} \in [0,1] \end{cases} \tag{1}$$

$$O_{ip} = f\left(I_{ip}\right) = \frac{1}{a + be^{-cP_{ip}}} \tag{2}$$

$$y_{kp} = \sum_{i=1}^{m} \left(v_{ki}O_{ip}\right) \tag{3}$$

Error reverse transmission: suppose d_p is the network output error, e_p is the sample error function [7], the formulas to define the two are as follows:

$$d_p = t_{kp} - y_{kp} \tag{4}$$

$$e_p = \frac{1}{2}\sum_{k=1}^{l}\left(t_{kp} - y_{kp}\right)^2 \tag{5}$$

3.2 *BP Neural Network Evaluation Factor System*

This article uses the analytic hierarchy process to analyze the evaluation factor indicators of the university education management evaluation system, and the evaluation factor indicators of the system are mainly composed of two parts: primary evaluation factors and second-level evaluation factors. Among them, the primary evaluation factors mainly include students' morality, intelligence, and physical fitness, arts, labor and other evaluation factors. The second-level evaluation factors perform a specific analysis of the primary evaluation factors[8]. Moral education mainly refers to the students' personal morals; Intellectual education mainly refers to students' grade[9]; Sports includes sports performance and sports competitions; Other evaluation factor indicators mainly include extracurricular activities that students participate in, getting funding for entrepreneurship, and school positions[10].

4 SYSTEM APPLICATION EFFECT

4.1 *Research Objects*

This paper takes a certain university as the research object, and applies the student education management evaluation system developed in this paper to the school's educational administration system. Teachers use the system to evaluate students. There are a total of 263 teachers in the school, and there are 100 teachers selected for investigation.

4.2 *Investigation Method*

This experiment uses questionnaires to investigate the effects of the designed system. After the school teachers use the student education management evaluation system designed in this article, they issue a questionnaire to the teachers. In order to make the survey easier, the questionnaire survey content is set up concisely, and a questionnaire survey is mainly based on the application effect of the system. The questions are mainly objective questions. The teacher only needs to choose the best answer from the answers given. The teacher's answering time is within 10 minutes.

4.3 *Investigation and Analysis*

Through the questionnaire, the answers to the questionnaire from 100 teachers are collected. After conducting statistical analysis on the questionnaire, there are 100 questionnaires in total, and the application effect of the system takes the satisfaction of respondents as the standard. After analyzing the survey results, we get Figure 2.
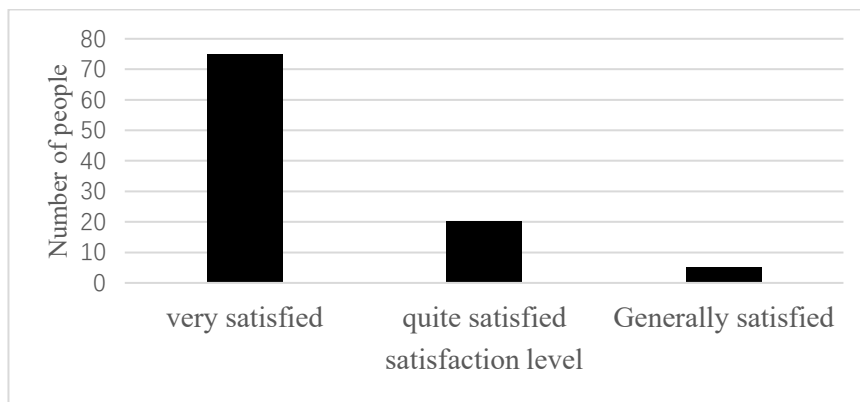

Figure 2 the survey results

It can be seen from Figure 2 that among the 100 teachers surveyed, 75 teachers said that the application effect of this system is very good, and they believe that the system can provide a full and fair evaluation of students, which is helpful for colleges and universities to evaluate education work. They show high satisfaction with the system. 20 teachers are satisfied with the system, and they think that the system helps to evaluate students, which has certain application effect; the remaining 5 teachers think that the effect of the system is average, and their satisfaction is also general. These data can fully prove that among the 100 teachers surveyed, the vast majority believe that the system is effective and helpful for colleges and universities to carry out the evaluation of student education, and the evaluation of students is more comprehensive and fairer. This shows that the application effect of the student education management evaluation system designed in this paper is good, which is conducive to the evaluation and education of students.

5 CONCLUSION

In this paper, MFA analysis method and BP neural network are combined to conduct an in-depth study on the management and evaluation system of college education. The main conclusions can be summarized as follows:(1) using BP neural network algorithm and correlation factor model can accurately extract the students' characteristics, so as to obtain the students' information; (2) using MFA analysis method can

establish the educational evaluation index from students' basic information, and provide accurate data reference for the system; (3) the application effect of the designed evaluation system is good, which proves that the system can conduct multi-factor evaluation with college students, so that the school evaluation work is comprehensive and fair. Due to my limited knowledge and technology, the research in this paper is not in-depth enough. In the future work, more experimental data and methods should be added to improve the performance of college evaluation system, so as to further promote the promotion and application of college evaluation system.

ACKNOWLEDGMENTS

REFERENCES

[1] Ge Xiaoou, Tang Dexian. The Basic Logic, Value Orientation and Duality of Student Management in My Country's Colleges and Universities [J]. Modern Education Management, 2019(09):118-122.

[2] Zhang Huainan. The Application Status and Development Trend of Big Data in Student Management in Domestic Colleges and Universities[J]. Chinese Medical Education Technology, 2019, 33(06): 664-669+674.

[3] Dong Jiangying. Research on College Student Management System Based on Comprehensive Quality Evaluation[J]. College Counselor, 2021(01): 67-71.

[4] Li Meng, Peng Yuxiang, Li Bingxiang. The Practical Application of Big Data Technology in the Management of College Students Under the Background of the Construction of Smart Campus——Taking LG Colleges in Shaanxi as an Example [J]. Journal of Ankang University, 2020, 32(01): 115 -120+128.

[5] Sun Gangcheng, Yang Chenmeizi. The New Requirements for the Evaluation of College Students from Social Changes in the Intelligent Age[J]. National Higher Education Research, 2020, 8(03): 54-61.

[6] Liu Zongmei. "Blockchain + AI" Helps Research on the Evaluation System of College Students[J]. China Education Informatization, 2020(21):38-42.

[7] Wu Daguang, Li Wen. The Stage Characteristics of Large-scale Online Teaching in My Country's Universities——An Empirical Study Based on a Questionnaire Survey of Students, Teachers, and Academic Staff[J]. Journal of East China Normal University (Educational Science Edition), 2020, 38(07):1-30.

[8] Qian Mingxia, Mao Zhihui, Zheng Jianshuang. The Construction of the Fairness Evaluation Model of Classroom Teaching Quality in Colleges and Universities——Based on the Perspective of Student Evaluation[J]. Education Teaching Forum, 2019(34): 64-68.

[9] Du Jiang, Cheng Jiangang. Research on the Implementation Strategy of Data-driven University Student Evaluation of Teaching[J]. China Audio-visual Education, 2019(09): 112-120.

[10] Yao Juncai, Shen Jing, Huang Chenrong. Objective Evaluation of Non-reference Video Quality Based on Multi-layer BP Neural Network [J/OL]. Acta Automatica Sinica: 1-13[2021-05-27]. https://doi .org/10.16383/j.aas.c190539.