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The Practical Effects of Political Education Courses Based on Artificial Neural Network Model

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ABSTRACT

Constructing an evaluation system for the practical effects of political education courses is beneficial for assessing existing educational work and serves as a "compass" for improving corresponding work. Therefore, this study explores the practical effects of college educational courses based on a computer artificial neural network model. The article first establishes a "three-dimensional index system" for evaluating educational courses in colleges based on the characteristics of artificial neural networks. Then, it introduces the computer artificial backpropagation (BP) neural network evaluation method and obtains strong empirical support through simulation experiments. Finally, a feasible "college artificial neural network evaluation model" is constructed. The simulation experiments show that the model's actual output is very close to the expected results, and satisfactory results are achieved when testing the model with sample data. Using the BP neural network model effectively eliminates traditional evaluation methods, significantly increasing the implementation efficiency of the evaluation. The improvement of the BP neural network enhances its flexibility and performs excellently in training. The model's expected performance in simulation experiments is highly consistent with actual performance, and it also achieves satisfactory results when measuring its performance using test data. In college education, it is a widely used evaluation method.

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1. Introduction

Computer artificial neural networks are a new technology that develops a theory, method, technology, and application system that can simulate, expand, and deepen human intelligence. On May 16, 2019, leaders issued an important congratulatory letter, reaffirming the significance of new artificial intelligence in basic education and actively promoting the deepening development of new artificial intelligence and basic

education, as well as educational reform, technological innovation, and making full use of the resource advantages of new artificial intelligence to provide better services for everyone's life. With the deepening development of the new generation IT revolution, integrating computer artificial neural networks with education has become an inevitable trend in education today and an important means to promote innovative education. Therefore, exploring the integration mechanism of high-tech teaching and the feasibility of achieving this combination has become an important task for the current development of education. Along with the rapid development of computer artificial neural network models, party committees and governments have high requirements for college education. Integrating the two is a systematic engineering, and the most core and fundamental is constructing the practical effect system. This is the basis for integrating artificial neural networks into education andguiding education methods reform and innovation. In this article, we aim to explore the practical effect of education in the computer era and propose a feasible and systematic evaluation system. To this end, the article first relies on the characteristics of artificial neural networks, attempting to build a "three-dimensional evaluation system" for education in college. Then, it introduces grey correlation analysis and BP neural network as a joint evaluation method and finally selects one university and 20 departments for practical verification, constructing a scientific and reliable evaluation system for the effectiveness of college artificial neural network courses.

2. Related Work

Internationally, there is no concept or expression of education," and therefore, there is no research on education in the era of artificial neural networks. However, in the 1930s, in response to the increasingly vulgar and shallow media environment's impact on young people, the concept of media literacy education emerged, and it has undergone several stages: immune, discernment, critical, and empowerment. The rapid development of digital media has brought new propositions to mature media literacy education increasingly, and comprehensive media literacy education is being incorporated into the education systems of most countries. Many countries, such as the United States, Canada, Germany, Australia, and France, have established media literacy education as a formal educational course in schools. Media literacy education is no longer inherently conflicting with students' media experiences. It is no longer considered as a way of discerning or insight concealed ideologies. In terms of artificial neural network literacy classroom teaching, teachers should provide students with a large number of safe and healthy websites related to teaching. They should guide students in exploring TV programs, magazine advertisements, newspaper columns, popular songs, etc. Foreign research in artificial neural networks and media literacy education has provided valuable references for strengthening and improving college students' education in the era of artificial neural networks.

China's research on education for college students in the artificial neural network era mainly focuses on three types. The first type mainly focuses on innovative research on education in the artificial neural network era. The second type mainly focuses on the laws or effectiveness of education under the artificial neural network environment. The third type mainly takes a certain type of media platform or environment in the artificial neural network as an entry point, discussing the results of research on education under the background of artificial neural networks or ideology in the context of artificial neural networks, which is also of reference significance for the research on college students in the era of artificial neural networks. The main points are as follows: First, the characteristics of college students in the artificial neural network era: The artificial neural network is the main battlefield of college students' activities, changing their learning methods, lifestyles, and interaction methods. It diversifies college students' information sources and strengthens its influence and guidance role. College students' value outlook is strengthening, and individuality is strengthenin g. Second, the artificial neural network is an opportunity: It provides new communication tools, exchange tools, and new ways of thinking for college students' education. The artificial neural network allows educators to update existing knowledge systems and education methods, provide new carriers for educators, and facilitate understanding and mastering college students' dynamics, improving the efficiency of education. Third, opportunities bring challenges. Diversified information exchange can easily lead to the ambiguity of the values of educational objects and a lack of value standards, causing college students' psychological trust crises and personality barriers. The mixed information sources have increased the difficulty of education. Fourth, the artificial

neural network brings college students closer to the distance between the subject and the object and dispels the "knowledge authority" of educators. Fifth, self-media continuously squeezes the communication space of traditional and mainstream media and the infiltration of threats to socialist construction for college students. Sixth, the virtual network space contains complex social reality issues, including ethical and moral problems.

3. Artificial Intelligence and BP Neural Network Model Algorithm

3.1. Principle of Artificial Intelligence Analysis and BP Neural Network Evaluation Method

Artificial neural network models can be implemented without any pre-settings. They can handle various models and have good self-adjustment, self-structuring, self-regulation, high reliability, and scalable nonlinear mapping. Therefore, they perform exceptionally well in model recognition, data mining, and analysis. BP neural network technology is one of the most frequently used neural network models today. Its uniqueness lies in the interaction of neurons only at one level, with no interaction or feedback mechanism at another level. The core idea of network learning is to transmit data information dually, transforming the offset of information into acceptable information, thereby constructing more accurate and effective models.

BP neural networks possess excellent nonlinear mapping, fast synchronous calculation, reliable self-adjustment, scalable structure, highly reliable reconfiguration, and the ability to quickly predict, make decisions, perform high-precision information mining, and make reliable result predictions. BP neural networks have been proven to solve various problems effectively. They can convert various forms of digital expression into digital forms that achieve nonlinear transformations. By collecting, analyzing, predicting, and adjusting various digital expressions and utilizing the error backpropagation algorithm in the "negative gradient descent theory," the neural network can continuously adjust digital forms to meet different needs. Currently, BP neural networks have been widely applied in various research fields. By adjusting model parameters, the goal is to minimize the deviation between neural network predictions and actual values.

The BP network consists of three layers, each composed of independent neurons whose size depends on the requirements. For example, in Figure 1, we see a three-layer BP network representing the input, hidden, and output layers. The size of each layer's neurons depends on their respective needs. These layers are independent of each other and can accomplish tasks. By adopting BP neural networks, we can establish effective horizontal connections between various samples and factors and utilize their autonomous reverse intelligent learning technology to effectively suppress and reduce the impact of external environments, further enhancing the accuracy and reliability of evaluations. By using intelligent programming techniques, the computational complexity of grey correlation analysis can be effectively reduced, significantly improving evaluation efficiency and enabling widespread application of the model.

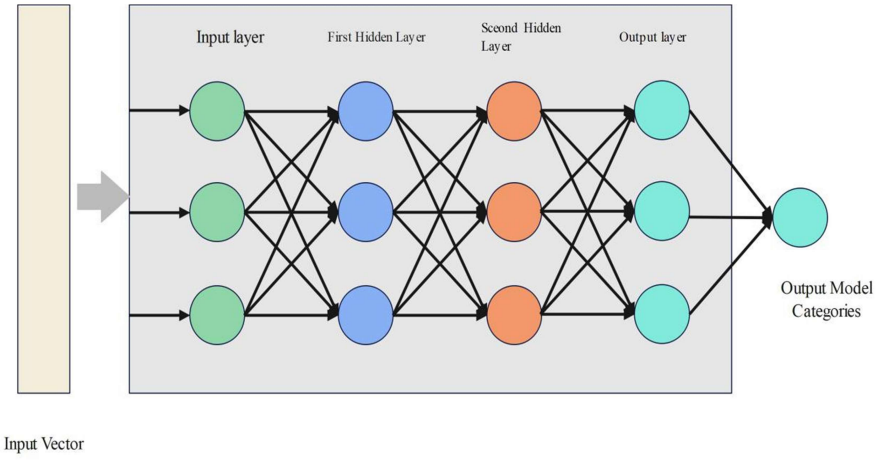

Figure 1. BP Neural Network Structure

3.2. Application of Grey Correlation Analysis Theory to Determine Comparative Coefficients and Benchmark Coefficient Sequences

Suppose we increase the number of evaluated samples to *m* and use *n* different evaluation criteria. In that case,*xki* will be used to measure the values of each criterion, where *k* = (1,2,...,*n*) and *i*= (1,2,...,*m*). Before conducting grey correlation analysis, we must determine a mother factor time series, typically *x0*.

$$x_0(k) = \{ x_0(1), x_0(2), \ldots x_0(n) \} \tag{1}$$

ξ(*k*) represents the relative difference between x at moment k and other reference values, meaning the relative difference of *x* to *x* is referred to as *k. e* is set as a resolution value between [0, 1] to reduce the interference of extreme values on the results. Thus, in practical operations, the value of e should be determined based on the interaction between sequences, and values below or equal to 0.5 are usually more appropriate.
If we denote:

$$\Delta\max = \max \max \left| x_0(k) - x_i(k) \right| \tag{2}$$

According to moments *x0* and *xi*, Δ *min* and Δ *max* can represent the minimum and maximum absolute errors between the two moments.

$$\xi_i(k) = \frac{\Delta\min + \zeta\Delta\max}{\left| x_0(k) - x_i(k) \right| + \zeta\Delta\max} \tag{3}$$

Correlation coefficients only represent the degree of correlation between each instantaneous data, and as there are many correlation coefficients and the data is too dispersed, it is not easy to make comparisons. Therefore, it is necessary to aggregate each set of correlation coefficients into a single value, and finding the average is one way to do this for this type of data. The closer the correlation degree *ri* is to 1, the stronger the correlation, and if $rk \geq 0.5$, it indicates a significant correlation. Based on the correlation strength, the indicator system is arranged in priority, and factors with poor correlation are eliminated.

4. Experimental Design and Result Analysis

4.1. Sample Selection and Data Collection

This article will select some institutions from 20 universities for research. These institutions include Institute of Common Management, Institute of Culture and Media Communication, Institute of Foreign Languages, Institute of Architectural Engineering Design and Arts, Department of Business and Law, Institute of Marxism, Institute of Geometry and Statistics, Institute of Physics and Electronic Devices, College of Biochemical and Engineering, School of Mechanical Engineering, College of Natural Resources Technology and Engineering, College of Materials Science and Engineering, School of Traffic Engineering, Institute of Civil Engineering, Institute of Metallurgy and Environmental Protection, Institute of World Science, Technology, and Information Physics, School of Natural Resources and Safety Management Technology and Engineering, School of Material Manufacturing and Life Engineering, and College of Information Science and Engineering. The evaluation of data typically includes two methods: one is to obtain information through digital means, such as the WeChat WCI index, the Weibo influence index, and the party application rate. The other is to obtain information through a 360-degree assessment, where experts from expert teams and academia assess the authenticity of the data. Both methods aim to better reflect the true situation of the data and accurately measure its quality. To better promote student learning, we recommend treating this process as communication between superiors and subordinates. This way, we can better grasp the students' learning situation, promptly identify issues, and take measures to improve. Additionally, we suggest making the assessment methods of this process public so that everyone can participate, ensuring objectivity and fairness in the evaluation.

4.2. Verification Results

Through MATLAB 8.0's BP neural network simulation, we found that the optimal solution of the model reached 0.82, and the momentum factor and learning rate were adjusted to 0.05. In contrast, the model error was adjusted to default. Additionally, we used the *newff* simulator to construct a forward neural network that can freely transform inputs and outputs. We used the *trainFcn* algorithm for training, with the default reference value being trained, and transformed it into the form of BP neural algorithm, i.e., training. This algorithm has high accuracy and robustness, especially for smaller networks (See Figure 2).

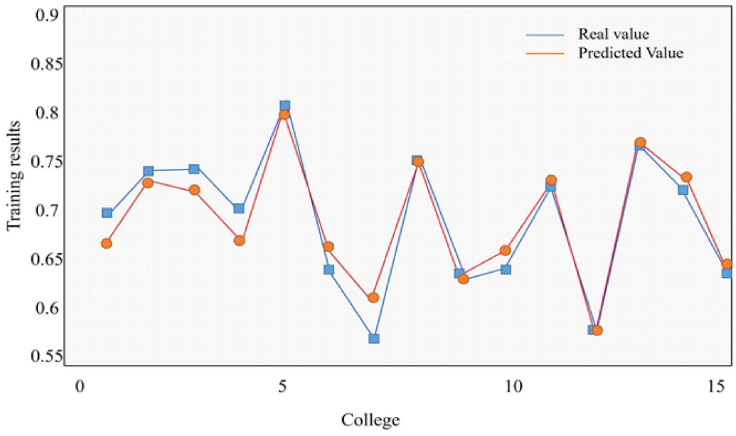

Figure 2. Actual Output vs. Expected Output

Figure 3 represents the output values of test samples, where 1-18 correspond to UC1-UC18 sample datasets. It can be observed that the diversity stabilizes when there are more than five samples. The richness values corresponding to 1-18 samples are shown. Changing the threshold from 1 to 9, i.e., considering nine richness values as detectable features, makes the trend of diversity growth more apparent. Thus, the threshold significantly impacts diversity and can express different meanings in different scenarios. Suppose *count_cutoff=1* shows saturation with very few samples. In that case, the threshold should be increased to highlight that it is necessary and meaningful to collect a sufficient number of samples for such a high-diversity expression. Compared to traditional evaluation methods such as AHP and fuzzy comprehensive evaluation, our evaluation system has been carefully studied in the current evaluation field, and unnecessary external influences have been completely excluded when setting evaluation criteria, thereby greatly improving the accuracy of the evaluation. By adopting the BP neural network model, traditional evaluation methods have been effectively cancelled, significantly increasing the implementation efficiency of the evaluation, and are expected to be widely applied in future evaluations.

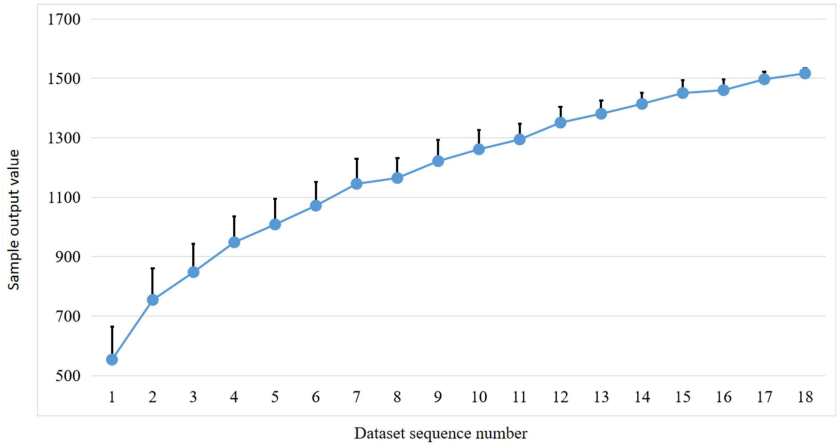

Figure 3. Output Values of Test Samples

5. Conclusions

In this article, we used artificial neural network technology to study the effects of the "Three-dimensional Index System" on education. Also, we explored the effectiveness of new media education in higher education institutions using grey correlation theory and BP neural network technology. To evaluate new media education in colleges and universities, we employed BP neural network technology and grey correlation theory to simplify the original index system and extract corresponding correlation degrees. Furthermore, we selected some representative parameters from the 18 research samples and combined them with the corresponding correlation degrees to construct a BP neural network to achieve more accurate evaluation results. Finally, we adopted effective strategies for the input variables of the BP neural network to enhance its accuracy and reliability. The improvement of the BP neural network makes it more flexible and performs well in training. In simulation experiments, we found that the model's expected performance is very close to its actual performance, and it achieved satisfactory results when measuring its performance using test data. After a detailed evaluation, we found that this evaluation model is very feasible, and its results are very objective and reasonable. In college education, it is a very common evaluation method.

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