ISSN:2790-167X DOI: 10.56028/aehssr.3.1.29

Design and research of English teaching platform based on BP neural network algorithm

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Abstract. In the development of modern education innovation, with the continuous innovation of social economy and science and technology, education information technology has undergone significant changes. The intelligent algorithm represented by BP neural network has been applied to the design of professional teaching platform, which not only provides technical support for students' network education learning, but also provides a new idea for English education innovation. According to the situation of English teaching at various stages in recent years, traditional English teaching pays more attention to the transmission of theoretical knowledge, and ignores the educational discussion of students' individual differences. Therefore, researchers propose to use intelligent algorithms to build a personalized education and learning platform to help students quickly understand and master professional English knowledge. Based on the understanding of BP neural network algorithm and the current research status of modern English teaching, this paper deeply discusses the English teaching platform based on BP neural network algorithm as the core, and carries on the development and test of the system operating function and performance. The final results show that the system platform design meets the needs of English teaching in the new era.

Keywords: BP neural network; Intelligent algorithm; English teaching; Teaching platform; Development test

1. Introducion

Under the background of modern educational innovation, English teaching has undergone earth-shaking changes under the influence of information technology environment. Information technology, as a new technological theory for the innovation and development of The Times, combines modern educational concepts and basic methods, integrates the development and design of diversified teaching resources, improves the overall teaching and research system, and optimizes students' scientific literacy. It is the focus of English teaching platform design and research at various stages at present. In English teaching, we should strengthen the application research of information technology and actively create a high-quality education management environment, which can not only enrich practical classroom teaching knowledge, but also achieve the expected teaching objectives and optimize students' learning ability. However, from the perspective of the current design and application of the English teaching platform, although it meets the basic needs of practical education, it cannot meet the long-term development goals in the field of education. There are many problems in the system application technology and operation function, among which the most critical is the defect of the service platform itself. Nowadays, the key information technologies for college English classroom teaching pay more attention to the realization of the expected teaching objectives. Common information means include QQ, wechat, online course platform, etc. However, most of these service platforms are oriented to common object programming, and the language expression of course content has many restrictions. For example, the cloud course platform does not have the function of video and voice push. This does not meet the requirements of communication and dialogue in language teaching. Therefore, while strengthening the research and control of English teaching platforms, scholars from various countries began to use intelligent algorithms to develop and design humanized and intelligent service platforms, which fully meet the needs of English education management in the new era and provide effective basis for the reform and innovation of English teaching at each stage.[1-3]

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BP neural network algorithm was first proposed by the scientific research team formed by Rumelhart, McClelland and others. It refers to a multi-layer feedforward network trained according to the error force propagation algorithm and is one of the most widely used neural network models in the new era. In current scientific research and discussion, artificial neural network system appeared after the 1940s, which refers to the formation of multiple neurons connected together with adjustable connection weights. It has the technical characteristics of autonomy, self-learning, distributed information storage, large-scale parallel processing, etc., and has been widely used in intelligent control, pattern recognition, information processing and other aspects. From the perspective of modern education field, the traditional BP algorithm belongs to a supervision and learning method. After the input of learning samples, the back propagation algorithm will be used to adjust the full-time sum deviation of the training network many times, so that the output vector and the expected vector are as close as possible. When the sum of the squares of the error of the output layer of the network is lower than the specified error, the practical training can be ended to ensure the weight and deviation of the network. The whole can be regarded as a learning method using iterative operations to solve full-time problems. Applying BP neural network algorithm to English intelligent computer-aided teaching platform can not only help professional teachers collect and store more data information, provide effective basis for practical education reform, but also share and apply a number of high-quality teaching resources, gradually optimize professional students' listening, speaking, reading, writing and translating abilities. Therefore, this paper mainly studies the BP neural network algorithm as the core of the English teaching platform, design structure and application effect, and from the perspective of classroom teaching evaluation, verify and analyze the application value of the overall education platform.[4-6]

2. Methods

2.1 System Requirements

According to the accumulated experience of English teaching research in recent years, it can be seen that the overall system business users include students, teachers and administrators, and the specific needs involve the following points:

First, the students. The overall system operation will be centered on the needs of students. The functional design of various modules should fully consider the principal position of students in education, pay attention to the students' learning conditions to set up independent, cooperative, communication and other course modes, and timely deal with the problems found, which is helpful to ensure that students have an active interest in learning at the same time, independent participation in classroom teaching activities. Among them, the user function design of students is shown in Figure 1 below:[7-9]

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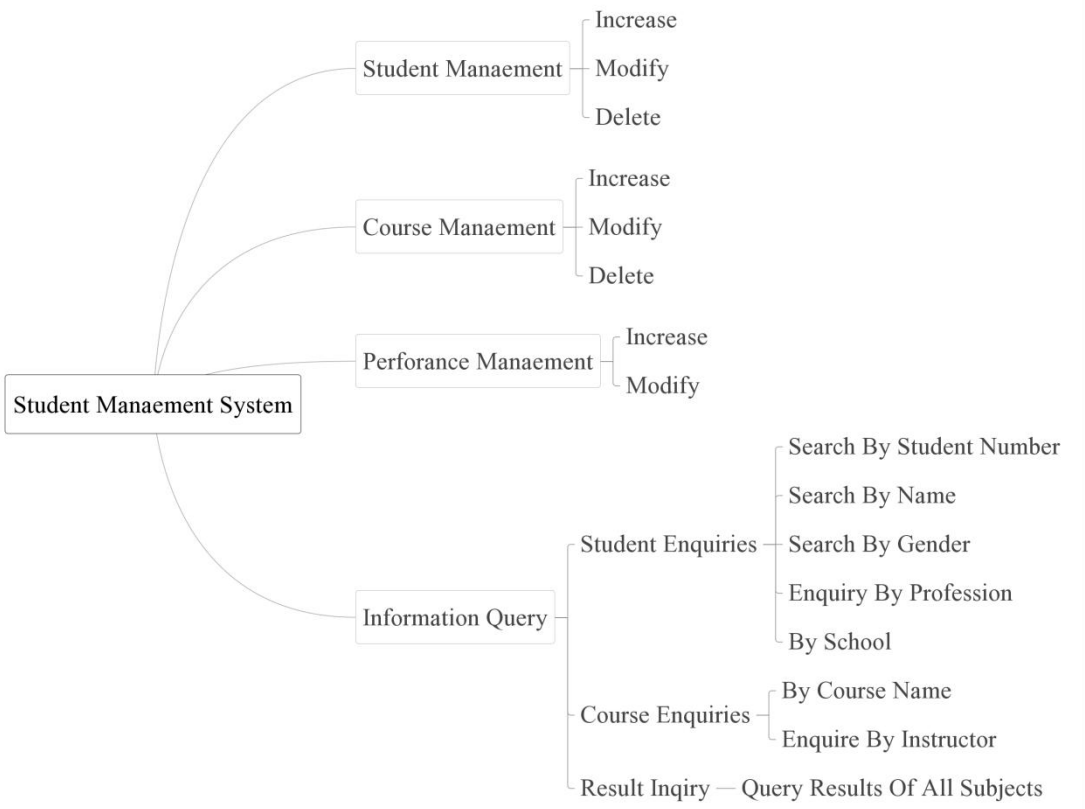

Figure 1 User function design structure diagram of students

Second, teachers. Teachers can query the course information on the network platform, upload, download and delete the video courseware related to English teaching, quickly understand the students' course selection and learning status on the English teaching platform, and set the course arrangement according to the number of students and students' ability. At the same time, the system will also design interactive modules to increase the communication between teachers and students, encourage and support students to participate in the research topics designed by teachers, and integrate into English teaching activities more quickly. In addition, teachers can query students' English scores and classroom evaluation results in the system platform, so as to scientifically adjust the subsequent education model and teaching courseware.[10-13]

And finally, managing people. The job functions of managers include two parts. On the one hand, it refers to teaching management. It is necessary to select or add professional teachers to participate in English teaching according to the teaching plan formulated in this semester, so that supervisors can review the teaching courseware, clarify the teaching arrangement in this semester, and then upload relevant teaching materials. On the other hand, it refers to system management, including teacher and student information management, user authority allocation, class information update, open course selection system and so on.

2.2 Architecture Design

The overall system design uses SSH architecture, which is mainly divided into three levels. The first is the user layer, the second is the web service layer, and the last is the database server. The overall system should ensure that the layers between the structures are very clear, easy to develop and apply at the same time, ensure that the system has strong scalability. The specific structure is shown in Figure 2 below:

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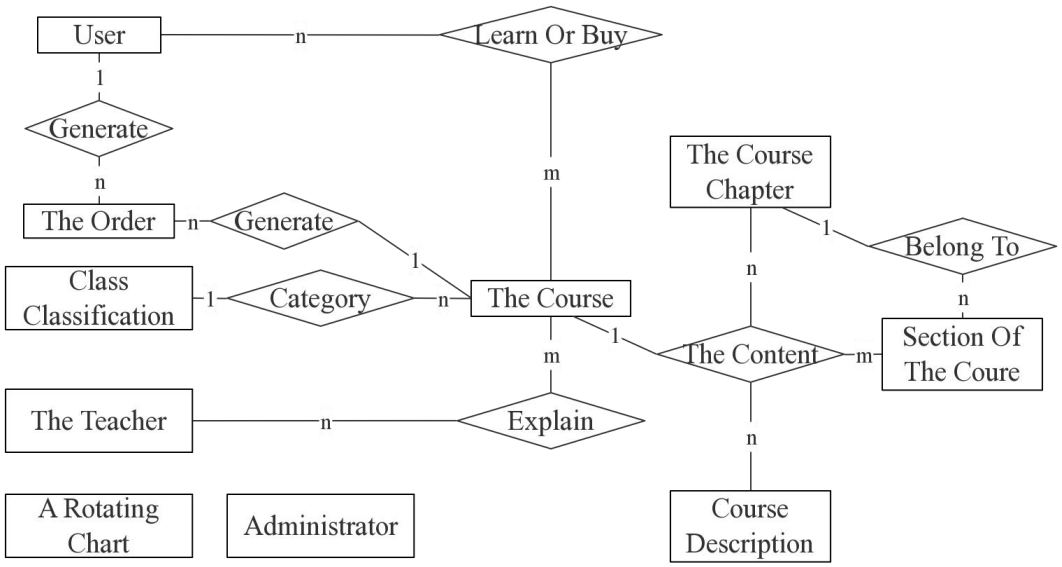

Figure 2 System architecture diagram

2.3 Database

Since the English education system contains a large amount of data information, the data description, organization structure and storage mode in the database directly affect the efficiency of the system. Therefore, when designing the database of the English teaching platform, it is necessary to first understand all kinds of data information, including users, courses, directories, knowledge points, reply topics, learning records and so on. Take the user information table as an example, in the process of system operation, the user operation will produce a large amount of data information, in order to further improve the efficiency and quality of the system operation, to use the storage way to complete the query, modify, update and other operations, so as to ensure that the system management personnel can modify the data storage process according to the requirements, without adverse impact on the source code. The database structure is shown in Figure 3 below:

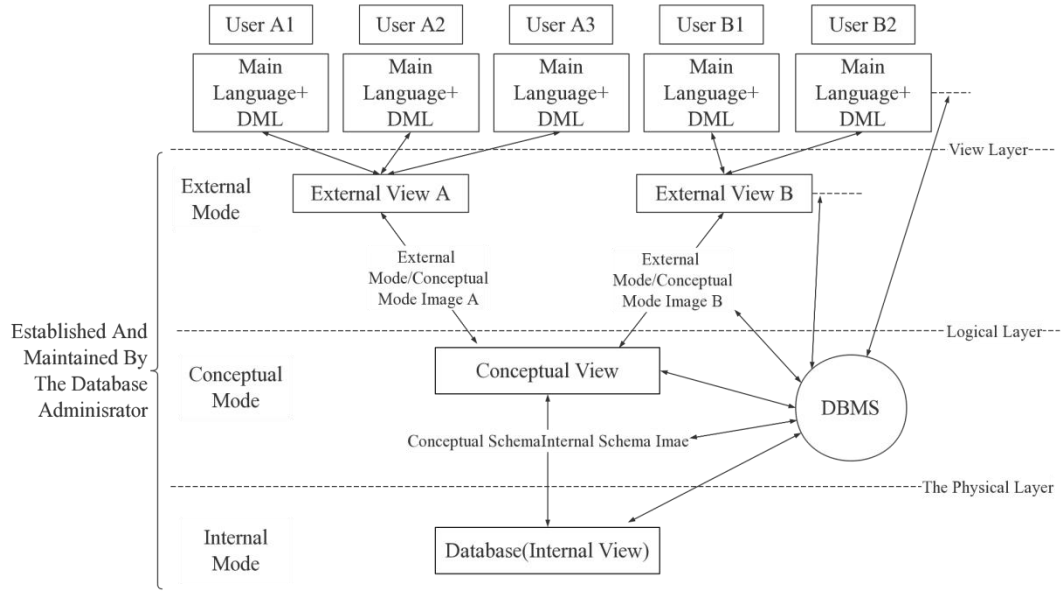

Figure 3 Structure diagram of the database

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2.4 BP neural network

In the process of system operation, BP neural network algorithm is applied to the intelligent diagnosis of English learning to evaluate the learning effect of English courses. The specific flow chart is shown in Figure 4 below:[14-15]

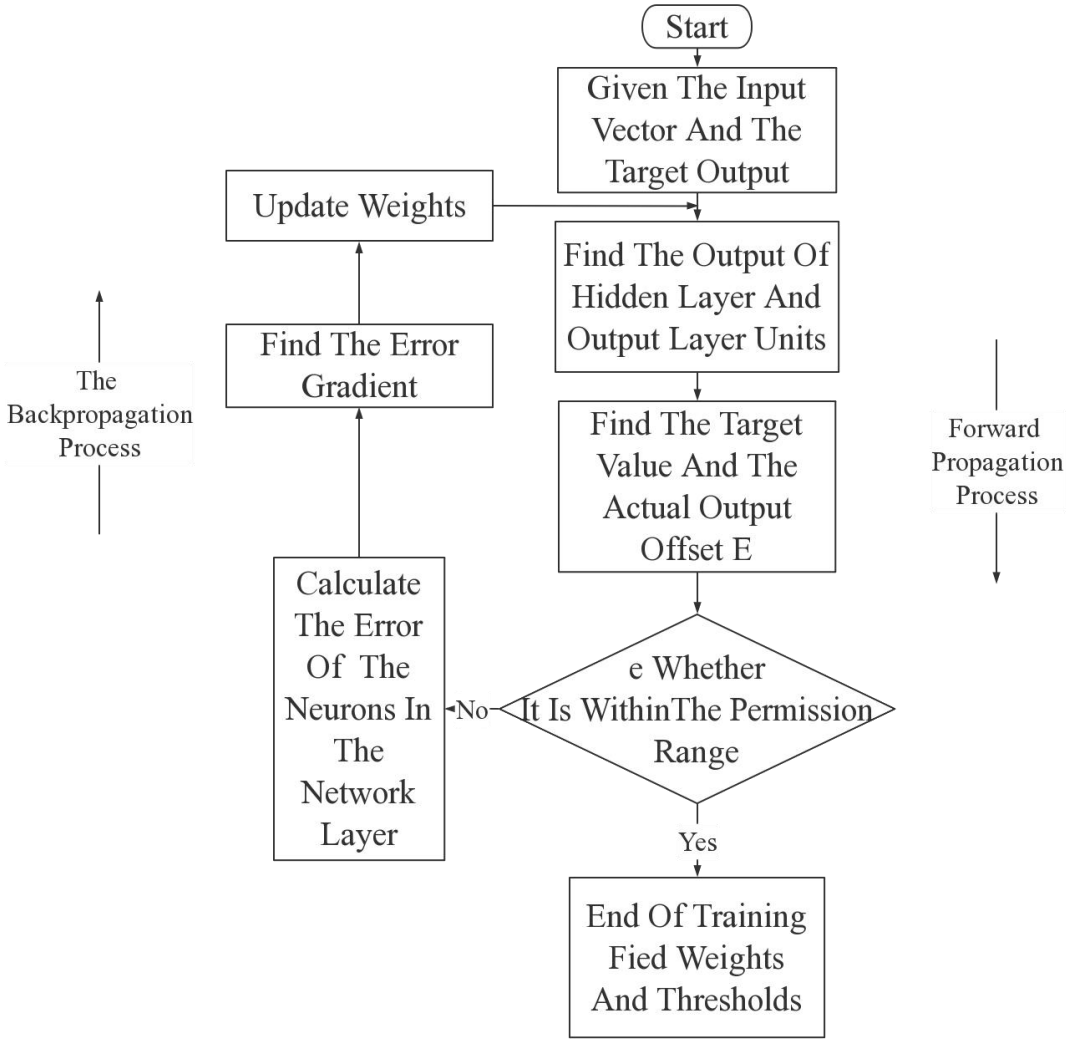

Figure 4 Flow chart of BP neural network algorithm

Since the BP neural network algorithm contains three or more one-way propagation networks, and the input layer and output layer have extremely high nonlinear mapping relationship, it is necessary to normalize each index first when evaluating the learning effect, and regard it as the input quantity of the BP neural network algorithm, and regard the quantized learning effect as the output quantity. According to expert experience, sufficient training samples are mastered, and then neural network algorithm is used to learn and adjust the weight of indicators. Finally, the trained BP neural network model is applied to the evaluation of English learning effect, so as to accurately judge students' English learning results.

3. Result analysis

The research system in this paper adopts B/S architecture, which has lower actual development and design cost and will not be restricted by regional conditions. The overall operation is very simple and the system has strong scalability. In the research experiment of this paper, the classroom teaching quality evaluation system as shown in Table 1 below is constructed, and the evaluation problem is regarded as a nonlinear mapping relationship between input and output. The three-layer

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BP neural network algorithm model is selected according to Kolmogorov principle. After determining the number of input neurons, multiple secondary indexes affecting teaching quality are selected. The teaching quality evaluation levels were divided into three categories, and finally the model training results as shown in Table 2 below were obtained:

Table 1 Teaching quality evaluation index

First order indicators	Secondary indicators	First order indicators	Secondary indicators
Teaching attitude.	Full lesson preparation, careful teaching X_1	Teaching methods	Be thorough X_7
	Care about students, pay attention to communication X_2		Enlighten your mind X_8
	Be strict X_3		
The teaching content	Be familiar and clear X_4	The teaching effect	Can master basic knowledge, theory X_9
	Explain, demonstrate and correct. X_5		Able to analyze and solve problems X_{10}
	Theory with practice X_6		

Table 2 Results of model training

Serial number	Expected output	The test results	Test level.
1	(001)	(0.0000 0.0159 0.9840)	Excellent
2	(010)	(0.0007 0.9905 0.0066)	Good
3	(010)	(0.0002 0.9991 0.0001)	Good
4	(010)	(0 0.9962 0.0092)	Good
5	(011)	(0 0.9772 0.9639)	General
6	(010)	(0 0.9912 0.0005)	Good
7	(010)	(0 0.9864 0.0117)	Good
8	(001)	(0 0.0134 0.9196)	Excellent
9	(010)	(0 0.9771 0.0307)	Good
10	(010)	(0 0.9955 0.0103)	Good
11	(011)	(0 0.9767 0.9866)	General
12	(010)	(0.0002 0.9987 0.0032)	Good
13	(001)	(0 0.0598 1.0000)	Excellent
14	(010)	(0 0.9593 0.0392)	Good
15	(011)	(0 0.9823 0.9554)	General

Based on the analysis of the above table, it is found that after the training of BP neural network algorithm, untrained samples are used to test and analyze the trained network system. It can be found that the test results are basically consistent with the expected output data, and the network test level is completely consistent with the actual level. It is proved that BP neural network algorithm is effective in the evaluation of teaching quality index, and its application in English teaching platform system is very important. From the perspective of the application of English teaching platform, BP neural network algorithm can control the influence of human factors to a certain extent, can automatically analyze the evaluation object, and the application of practical model is effective. It should be noted that the BP neural network algorithm also has some limitations, such as the determination of the number of nodes in the hidden layer and the local optimum that learning and training are prone to fall into, which will affect the accuracy of the final education quality evaluation. Therefore, in the future education innovation and development,

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Chinese researchers should strengthen the BP neural network algorithm research efforts, pay attention to optimize the existing English teaching platform and basic functions, pay attention to provide technical support for professional education guidance.

Conclusion

To sum up, how to improve the quality of teaching and arouse students' interest in learning is the main issue of English education in the new era. With the steady development of social economy and science and technology, English teaching proposes to use intelligent algorithms to build a better teaching platform, gradually strengthen the evaluation of professional teaching quality, control various main factors affecting teaching quality, and formulate more perfect educational management measures. In this paper, BP neural network algorithm plays an important role in the English teaching platform, which can help professional teachers to quickly evaluate the quality of practical teaching, identify the problems existing in classroom education management, construct the neural network evaluation model system, and provide an effective basis for the innovation and development of education in the new era. Therefore, Chinese education departments should continue to explore the application value of intelligent algorithms represented by BP neural network when building and promoting English teaching platforms, so as to provide better education network services.

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ISSN:2790-167X DOI: 10.56028/aehssr.3.1.29
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