Evaluation model of English teaching effect based on neural network algorithm and support vector machine

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Abstract- **The role of support vector machine in the evaluation of English teaching effect is very important, but there is a problem of inaccurate evaluation of results. The traditional English teaching mode cannot solve the accuracy and efficiency of the effect evaluation of students' English teaching and cannot meet the requirements of English teaching effect evaluation. Therefore, this paper proposes a neural network algorithm to innovate and optimize the analysis of support vector machines. Firstly, the relevant theories are used to construct a multi-index English teaching effect evaluation system with teachers and students as the main body, and the indicators are divided according to the data requirements of English teaching effect evaluation indicators to reduce the support vector machine in the interfering factor. Then, the neural network algorithm is used to solve the optimal solution of kernel function parameters and regularization parameters of the support vector machine, and the support vector machine scheme is formed, and the support vector machine results are carried out Comprehensive analysis. MATLAB simulation shows that the evaluation accuracy of the English teaching effect of the neural network algorithm and the support vector machine under certain evaluation criteria Optimal, short evaluation time.**

Keywords- evaluation model; neural network algorithms; English language teaching; Support vector machines

I. INTRODUCTION

The evaluation of English teaching effect is an important research question in school education evaluation, which is of great significance for the improvement of students' English level [1]. However, in the process of English teaching, the support vector machine scheme has the problem of poor accuracy, which has brought certain adverse effects to students' learning of English [2]. According to relevant scholars, the neural network algorithm is applied to the analysis of students' English teaching [3], It can effectively analyze the support vector machine scheme and provide corresponding support for the support vector machine [4]. On this basis, this paper proposes a neural network algorithm to optimize the support vector machine scheme and verify the effectiveness of the model [5].

With the development and popularization of artificial intelligence technology, more and more application scenarios have emerged, including the field of education[6]. In the field of education, the application of artificial intelligence technology has begun to change the education model and improve the teaching effect. Neural network algorithms and support vector machines (SVMs) are two common artificial intelligence technologies[7], and the application of these two combinations in the process of English teaching is also attracting more and more attention.

This paper will discuss the influence of the combination of neural network algorithm and SVM on the effect of English teaching from the following aspects: first, the introduction and characteristics of neural network algorithm and SVM, followed by the application of neural network algorithm and SVM in English teaching, and finally the influence of neural network algorithm and SVM in English teaching[8].

A. Introduction and characteristics of neural network algorithms and SVMs

1. Neural network algorithm

A neural network algorithm is a computational model that mimics the nervous system of the human brain. It consists of a large number of nodes and connections, self-learning and adaptable, and can analyze and process complex data[9]. During the learning process, the neural network algorithm can repeatedly adjust the weights between the information and continuously optimize itself[10]. The advantage of neural network algorithms is that they can process multidimensional data and are suitable for a large number of complex computational problems[11]. Among them, Deep Neural Network (DNN) is the most popular neural network model in recent years, and it is also one of the most representative machine learning technologies[12].

2. Support vector machine

A support vector machine is a machine learning algorithm, which is a non-probabilistic binary linear classification model for problems such as classification, regression, and outlier detection[13]. It achieves classification by mapping data into a high-dimensional space and finding a hyperplane that maximizes class breaks. SVM can process high-dimensional data and has high classification accuracy and generalization ability. At the same time, due to its fast training speed and low memory footprint, it is also a very suitable algorithm for large datasets.

3. Combination of neural network algorithm and SVM

Both neural network algorithms and SVMs have their own advantages, but they also have their own limitations.

When neural network algorithms are faced with high-dimensional data, the training process requires a lot of time and computing resources. SVMs, on the other hand, cannot handle large amounts of nonlinear data. Therefore, combining neural network algorithms and SVMs can compensate for each other's shortcomings and improve the performance and accuracy of the model.

B.Application of neural network algorithm and SVM in English teaching

1. Speech recognition

Neural network algorithms and SVMs are also widely used in English speech recognition. By learning from a large amount of speech data, neural network algorithms and SVMs can realize the recognition and translation of natural language speech, and provide corresponding error correction and feedback. This method allows students to feel the pronunciation and intonation of English more intuitively, so that they can better learn spoken English.

2. Text classification

The application of neural network algorithms and SVMs in English text classification is also very extensive. By learning a large amount of English text data, these two algorithms can realize the automatic classification and correction of English articles. This method makes it easier for students to understand the main idea and grammatical structure of the text, so that they can better grasp English writing skills.

3. Smart conversations

The application of neural network algorithms and SVMs can also be extended to intelligent conversational robots in English. By applying these two algorithms, intelligent conversational bots can be developed to enable natural language conversations with students. By talking to the robot, students can more intuitively feel the application of spoken English and the structure of grammar rules, so as to better improve their spoken English.

C.The impact of neural network algorithms and SVM in English teaching

1. Improve teaching efficiency

The combination of neural network algorithm and SVM can realize intelligent teaching of English speech, text and speaking, thereby improving the efficiency and level of students' English learning. This approach allows students to better grasp the basics of English in a shorter period of time, so that they can better cope with exams and daily English communication.

2. Personalized teaching

The application of neural network algorithms and SVM can also provide more personalized teaching solutions for English teaching. These two algorithms can provide tailored teaching content and learning plans for each student, providing students with more targeted teaching services according to their individual needs and interests.

3. Improve the quality of teaching

Neural network algorithms and SVMs can also improve the quality of teaching. These two algorithms can continuously correct students' grammar and pronunciation errors during the teaching process and give real-time feedback. This method can enable students to have a deeper understanding of English knowledge and correct mistakes in learning, thereby improving the effectiveness and quality of English learning.

The combination of neural network algorithm and SVM has an important impact on the English teaching effect. Through the application of these technologies, intelligent teaching of English voice, text and spoken can be realized, improving the efficiency and level of English learning for students, and providing more personalized teaching solutions for each student. In the future, the application of artificial intelligence technologies such as neural network algorithms and SVM will be deeper, and its application in the field of English education will become more popular and mature.

II. RELATED CONCEPTS

A. Mathematical description of the neural network algorithm

The neural network algorithm uses the relevant theory to optimize the support vector machine scheme, and according to the indicators in the support vector machine, finds the advantages and disadvantages in the evaluation of English teaching effect, and analyzes it the integration of the support vector machine scheme avoids the "dimensional disaster" in a certain sense, and finally judges the feasibility of English teaching effect evaluation. The neural network algorithm combines the advantages of relevant theories and uses relevant data in English teaching of teachers and students to quantify, which can improve the evaluation of English teaching effect of support vector machine.

Suppose I. The optimal kernel function parameter is σ , and the regularization parameter is b , and the optimal solution is calculated and described as, and the optimal effect evaluation is a , obtained as shown in Equation (1).

$$y = \sum_{i=1}^{l} (a_i^2 - a_i) \cdot K(x, x_i) + b \qquad (1)$$

B. Selection of English teaching effect evaluation program

Hypothesis II The predicted value is $y_1^{'}$, the inertia weight coefficient is w_i , the number of training samples is N , and the actual value is y_i, as shown in equation (2).

$$f = \sum_{i=1}^{N} (y_i - y_1^{'}) \cdot \sqrt{a^2 + b^2} \qquad (2)$$

C. Analysis of support vector machine schemes

Before carrying out the neural network algorithm, it is necessary to conduct a multi-dimensional analysis of the support vector machine scheme and map the support vector machine requirements to the sample of the English teaching effect evaluation index system and seek the support vector machine The kernel function parameter and the regularization parameter are optimally solved. First, the evaluation of English teaching effect is comprehensively analyzed, and the threshold and index weight of the support vector machine scheme are set to ensure the accuracy of the neural network algorithm. The teaching effect evaluation index system is a systematic test of the support vector

machine scheme, which needs to be innovatively analyzed. If the evaluation of English teaching effect is in a nonnormal distribution, the support vector machine scheme will be affected, which will reduce the accuracy of the overall support vector machine. In order to improve the accuracy of the neural network algorithm and improve the evaluation level of the effect of the support vector machine, the support vector machine scheme should be selected, and the specific scheme selection is shown in Figure 1.

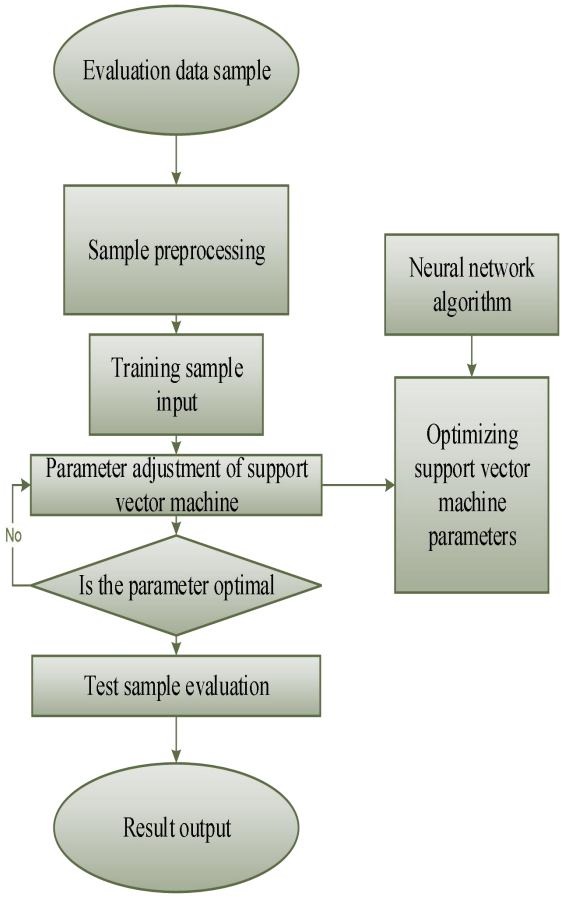

FIGURE I.THE SELECTION RESULTS OF THE EVALUATION PLAN OF ENGLISH TEACHING EFFECTIVENESS

According to the support vector machine scheme, the English teaching effect evaluation scheme shows a non-linear distribution, which is in line with the objective facts. The evaluation of English teaching effect is not directional, indicating that the evaluation scheme of English teaching effect has strong randomness, so it is regarded as a high analytical study. The evaluation of English teaching effect meets the normal requirements, mainly because the relevant theory adjusts the evaluation of English teaching effect, removes the scheme that does not meet the conditions, and supplements the default scheme to make the whole The dynamic correlation of the support vector machine scheme is strong.

III. OPTIMIZATION STRATEGY FOR EVALUATING STUDENTS' ENGLISH TEACHING EFFECTIVENESS

The neural network algorithm adopts a random optimization strategy for the evaluation of students' English teaching effect and adjusts the relevant parameters to realize the scheme optimization of students' English teaching effect evaluation. The neural network algorithm evaluates the English teaching effect of students into different training levels, and randomly selects different sample parameters. In the iterative process, the support vector machine scheme with different training levels is optimized and analyzed. After the optimization analysis is completed, the support vector machine English teaching effect level of different schemes is compared, and the best evaluation of students' English teaching effect is recorded.

IV. PRACTICAL CASES OF EVALUATION OF STUDENTS' ENGLISH TEACHING EFFECTIVENESS

A. Introduction to support vector machines

In order to facilitate the research of support vector machine, the evaluation of English teaching effect in complex situations is taken as the research object, with 10 paths and a test time of 2h The evaluation scheme of the vector machine for English teaching effect is shown in Table I.

TABLE I. SCHOOL SUPPORT VECTOR MACHINE REQUIREMENTS

Scope of application	Innovative effect	Teaching effectiveness	Evaluate effectiveness
elementary school	94.34	92.09	92.43
junior high school	91.34	92.21	92.58
high school	93.80	93.24	93.46
university	92.36	91.98	91.43
adult	92.93	92.82	92.47

The support vector machine procedure in Table I. is shown in Figure II.

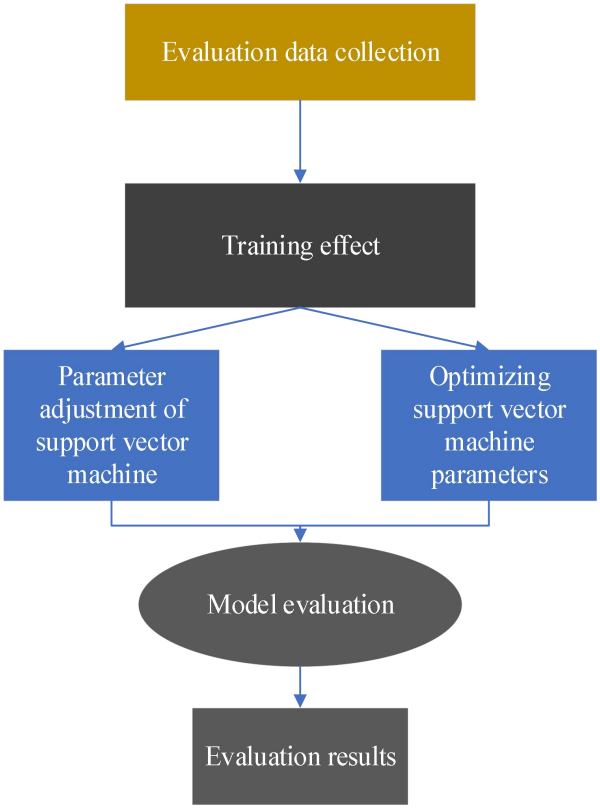

FIGURE II THE ANALYSIS PROCESS OF THE EVALUATION OF THE EFFECTIVENESS OF ENGLISH TEACHING

Compared with the traditional English teaching mode, the support vector machine scheme of neural network

algorithm is more in line with the actual evaluation requirements. In terms of the rationality and training time of English teaching effect evaluation, the neural network algorithm is better than the traditional English teaching mode. Through the change of the support vector machine scheme in Figure II, it can be seen that the stability of the neural network algorithm is better, and the training speed is faster. Therefore, the speed of the support vector machine scheme of the neural network algorithm and the accuracy of the English teaching effect evaluation scheme are better.

B. Evaluation of students' English teaching effectiveness

The support vector machine scheme for evaluating the effect of students' English teaching includes unstructured information, semi-structured information, and structural information. After the pre-training of neural network algorithm, a support vector machine scheme for students' English teaching effect evaluation is obtained, and the student's English teaching effect is evaluated the feasibility of the support vector machine scheme is analyzed. In order to verify the evaluation effect of English teaching more accurately, the support vector machine scheme of different levels of English teaching is selected, and the support vector machine scheme is shown in Table II.

TABLE II THE OVERALL SITUATION OF THE ENGLISH TEACHING EFFECTIVENESS EVALUATION PROGRAM

category	Conformity	Analysis rate
elementary school	92.60	91.68
secondary school	92.74	90.80
university	92.46	92.55
teacher	90.70	89.57
mean	91.80	91.85

C. Evaluation and stability of English teaching effect of support vector machine

In order to verify the accuracy of the neural network algorithm, the support vector machine scheme is compared with the traditional English teaching mode, and the support vector machine scheme is shown in Figure III.

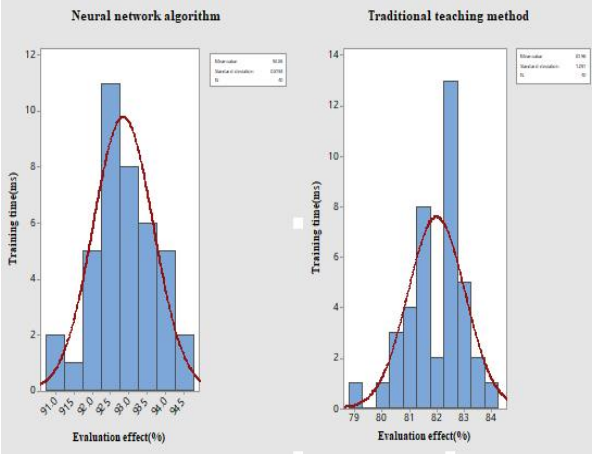

FIGURE III EVALUATION OF THE EFFECTIVENESS OF ENGLISH TEACHING IN DIFFERENT WAYS

It can be seen from Figure III that the English teaching effect of the neural network algorithm is higher than that of the traditional English teaching mode, but the error rate is lower, and the support vector machine of the neural network algorithm is proved after comparison It is relatively stable, while the teaching effect evaluation of the traditional English teaching model is uneven. The average support vector machine scheme of the above two methods is shown in Table III.

TABLE III COMPARISON OF SUPPORT VECTOR MACHINE ACCURACY OF DIFFERENT METHODS

algorithm	Evaluation of the effectiveness of English teaching	Magnitude of change	error
Neural network algorithms	95.61	96.22	0.69
Traditional English teaching mode	82.74	75.87	6.87
P-value	45.27	42.10	43.18

By Table III It can be seen that the traditional English teaching mode has deficiencies in the stability and evaluation time of English teaching effect evaluation in terms of English teaching effect evaluation, and English teaching effect evaluation There are large changes and a high error rate. The general results of the neural network algorithm have a higher evaluation of the English teaching effect and are better than the evaluation mode of the English teaching effect. At the same time, the evaluation of the English teaching effect of the neural network algorithm was greater than 95.60%, and the accuracy did not change significantly. In order to further verify the superiority of the neural network algorithm. In order to further verify the effectiveness of the proposed method, the neural network algorithm is generally analyzed by different methods, as shown in Figure 4.

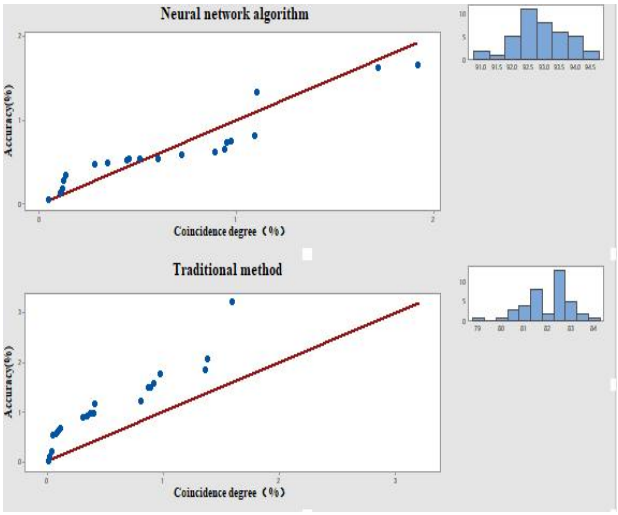

FIGURE IV EVALUATION OF ENGLISH TEACHING EFFECT OF NEURAL NETWORK ALGORITHM AND SUPPORT VECTOR MACHINE

By Figure IV It can be seen that the evaluation of the English teaching effect of the neural network algorithm is significantly better than the evaluation of the effect of the traditional English teaching mode, and its fundamental is the neural network algorithm Added support vector machine parameter adjustment and set the standard weight to eliminate the support vector machine scheme that does not meet the requirements.

V. CONCLUSION

In view of the complexity of the quantitative nonlinear function relationship between the evaluation indicators of English teaching effect, the subjectivity of the evaluation

effect affects the objectivity and fairness of the evaluation. Based on this, this paper proposes a neural network algorithm, and combines relevant theories to optimize the evaluation of English teaching effect, accurately evaluate the English teaching effect, and improve the overall level of English teaching. The research shows that the neural network algorithm can improve the accuracy and stability of the evaluation of English teaching effect, so that the evaluation accuracy rate is the highest, the evaluation time is short, and the evaluation effect is the best 。 However, this algorithm still has some shortcomings, and it is hoped that after continuous learning and verification, more and better methods can be applied to the evaluation of English teaching effect.

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