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Research Article

Research and Analysis on the Integration of Artificial Intelligence in College English Teaching

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With the rapid development of modern information technology, students' education and computer technology begin to blend, and the modern teaching mode is quite different from the traditional education mode known in the past. In view of the current college English teaching in the information age, this study puts forward the way of integrating computer information technology with college English teaching, improves MLP algorithm, puts forward a new artificial intelligence algorithm, improves its calculation efficiency, and uses the optimized GA-MLP-NN (Genetic Neural Network Algorithm for the Multilayer Perceptron) algorithm in college students' oral correction program. Firstly, GA-MLP-NN algorithm is used to optimize college English teaching so that more complex structures can be learned and dealt with. Incremental hidden layer unit neural network is added, which makes the operation more accurate based on S-type recursive function. Then, the oral English system is established, using the GA-MLP-NN neural network model. Finally, we evaluate the parameters of the model, design a comparative experiment and a questionnaire survey to verify the rationality and feasibility of the guess, which proves that this method can deal with more complex programs, and make students learn English more handy and close to students' needs by using computer technology.

1. Introduction

Due to the development of computer information technology, many traditional industry models have undergone tremendous changes. Traditional English teaching methods are gradually declining in the era of rapid development of big data industry. Traditional English teaching is facing great challenges, which are both a crisis and a challenge for the traditional teaching mode. In recent decades, computer deep learning can imitate the learning process of the human brain and obtain the inherent characteristics and natural rules of data such as sound, video, and image, which can be applied to all walks of life. Ding et al. [1] have designed a deep learning method which can be used to assist and improve college English online teaching by combining the multilayer neural network model with K-means clustering algorithm. If we want to improve the level of college English teaching, we cannot avoid creating a good oral environment. Therefore, the spoken English dialogue system based on computer big data analysis and artificial neural network is very important. Liu [2] proposed an evaluation model connecting specific time-delay neural network (TDNN) layers by previous feedback. By using different feature representations of each word, abundant information can be obtained and the number of model parameters can be reduced. In oral English teaching, it is inevitable to detect oral grammar. In college English grammar detection, oral grammar is the content with the highest error rate. Du [3] proposed in the research of intelligent error correction of college oral English grammar based on GA-MLP-NN algorithm that compared with the traditional multilayer perceptron prediction, the optimized algorithm significantly improves the running efficiency of the model and shortens the prediction time. During the university period, in the large-scale classroom teaching, teachers often cannot interact effectively with every student, which leads to a significant reduction in teaching

effect. Therefore, relevant research and investigation have been done. Wang et al. [4] found that PDA classroom teaching can achieve a central balance between teachers and classmates, improve the interaction between teachers and classmates, and increase students' absorption of knowledge. Yang et al. [5] found that there are still many problems in English teaching mode based on multisource information fusion algorithm through the investigation of college language teaching. Tian [6] found that the intervention of multimedia makes educational resources richer, pays more attention to students' status, and improves educational management. Hu [7] pointed out that, after the integration of computer information technology and foreign teachers' courses, traditional teaching elements (textbooks and contents) were replaced by new teaching technologies (multimedia and network programs). Nael et al. [8] put forward AraScore. Through empirical research and investigation using the baseline model, RNN, LSTM, and other language models, it is found that using the ELECTRA language model to realize the task at hand in language teaching is the best system, which highlights the powerful performance of computer deep learning in language teaching. Giosue et al. [9] introduced an ATE system based on RNN, which was tested in Italian and English, and concluded that it can solve the complexity evaluation problem of different languages. In the overall framework of English learning, considering the integrity and overall situation of learning, Wu et al. [10] refer to the combination of Einstein's cognition, emotion, behavior, and attitude with modern classroom teaching to form an overall goal classification framework suitable for university teaching mode. Alshara et al. [11] apply the interdisciplinary learning model in SEE portal to computer network and education, which is used to overcome the teaching and island model, so that software engineers can communicate with relevant knowledge in the field of education. Based on deep learning, Yan and Dong [12] analyzed iSmart platform and offline classroom and constructed a teaching mode combining the two. Brauer et al. [13], in the HCI study, elucidate Web-based software application interactions between Web analysts and users. Waiganjo [14] has studied the views and attitudes of integrating information technology into teaching in rural areas. The government should strengthen ICT construction and strengthen the popularization of information and communication technology in schools. Ruby and David [15] provide a way to make English learning learn and practice in an unknowable environment, using NLN to provide standards. Li [16] explores the hybrid model of college English based on modern educational technology and computer technology. Yuan [17] analyzes the connotation of artificial intelligence technology and the technical problems in ETIP and gathers contemporary information to prove that the construction of college English education needs to follow the traditional educational concept and add artificial intelligence technology to the educational mode. Haet al. [18] studied the attitudes and thoughts of students and teachers on oral corrective feedback and discussed the influence of language education, teachers, and project designers on teaching. Mohammad and Junji [19] developed the application of Wordhyve according to image memory, which can regard learning experience as a trigger to enhance the vocabulary of a second foreign language and help users learn a language better by analyzing logs. Zhang [20] proposes an innovative teaching model of college English reverse classroom through intermediary intelligent adjustment algorithm [21], in which virtual multimedia teaching [22] needs to be used to replace outdated technology and specify specific teaching schemes related to it. Yanhong YUE [23] established a quality-oriented hierarchical process model of educational evaluation analysis for college English teaching reform [24]. Pemba et al. designed software, which can provide learning interaction, arrange small learning tasks that are more suitable for users' English, and reflect the evaluation to the background analysis of learning. Song [25] proposed that the English multimedia teaching mode will become an inevitable trend of English teaching reform and development. It is necessary to stimulate students' learning winter and learn more independently; the principle of taking teachers as the leading factor and students as the main body avoids repetition and improves classroom teaching efficiency. In the related literature description, the corresponding intelligent methods are generally used to realize the application and analysis of spoken English, and the corresponding neural network is also used to realize the detection and application of English grammar in order to improve the recognition rate. There is also an analysis of the corresponding English application scenarios, and relevant applications are carried out through the curriculum characteristics.

2. Experimental Model

2.1. Computer Intelligent Computing and Neuroscience. Neural network can be applied to computer image analysis and the regression method can be used to make machines imitate and learn human computation process. MLP algorithm is one of many algorithms about artificial intelligence. In machine learning, MLP algorithm can improve the model's data error and achieve comprehensive optimization performance. However, there are also obvious drawbacks. The MLP calculation is too inefficient, resulting in a particularly slow machine learning and training process. In the traditional multilayer perceptron model, the operation on single data cannot achieve the desired effect, as shown in Figure 1.

In order to solve the problem of low computational efficiency of MLP algorithm, we propose another artificial intelligence algorithm. On the basis of MLP algorithm, the number of nodes of network nerves is improved when working cooperatively at different levels. The optimized GA-MLP-NN algorithm can complete the function of multidirectional computation at the same time, which greatly improves the efficiency of the model in machine learning training and greatly saves time and cost.

2.2. GA-MLP-NN Arithmetic. GA-MLP-NN algorithm [26, 27] is a research technique for oral grammar correction. It is one of the artificial intelligence algorithms that can deal

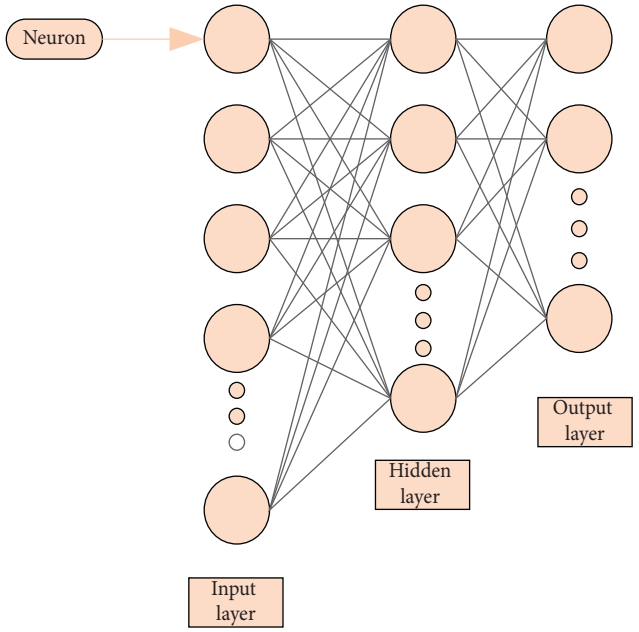

Figure 1: Network structure block diagram of multilayer perceptron system.

with a large amount of data and information, realize multinode output, and solve practical problems:

$$A = f\left(W_1^T * X\right), \tag{1}$$

$$Y = f\left(W_2^T * A\right). \tag{2}$$

The purpose of training is to reduce the fault tolerance of data and achieve the ultimate goal of optimization. In the training process, only the weights need to be adjusted out of the appropriate range to achieve the goal.

Then, the minimum distance solution under the hidden layer can be obtained:

$$W_2^T * R - S_2 = \min. \tag{3}$$

Using the transfer function in the model, we can determine the range of parameter values for matrix R:

$$W_2^T * \Delta R - \left(S - W_2^T * A\right)_2 = \min. \tag{4}$$

The linear regression model used in the experimental analysis is as follows:

$$W_T = [W_1 W], \tag{5}$$

$$X_r = [XR], \tag{6}$$

$$Y = a + bX + \varepsilon. \tag{7}$$

The formula includes constant term, linear regression coefficient, and error value. To sum up, it is the function variables that have a great influence on the whole expected experimental data. For the significance test of integrity, the required calculation formula is as follows:

$$ESS = \sum\left(\hat{Y}_i - \overline{Y}\right)^2, \tag{8}$$

$$RSS = \sum\left(Y_i - \hat{Y}\right)^2. \tag{9}$$

The entire multilayer perceptron of the model needs to insert the known variables into the activation function, and the expected result factor after the change is obtained through the control of the model function. The formula for the activation function can be expressed as follows:

$$t - \frac{R}{\sqrt{\left(1 - R^2\right)(n-2)}}. \tag{10}$$

The result can be expressed as

$$\phi(v) = \tanh(v), \tag{11}$$

$$\hat{y} = \tanh\left(d \sum_{d=1,n=1}^{n} w_d x_n\right). \tag{12}$$

The above model is studied by adjusting the range of weight parameters in the function, and the final result is approximate to the actual data:

$$w_j^{k+1} = w_j^k + \beta\left(y_i - y_i^k\right)x_{ij}. \tag{13}$$

If the experimental results are close to or consistent with the expected results, the current values can continue to be used; otherwise, the weights and thresholds need to be updated for adjustment. In this model, we set two variables, which are the total number of data syntax and the syntax error correction rate:

$$h_t = f\left(h_{t-1}, x_t\right), \tag{14}$$

$$\mathrm{C} = \mathrm{q}\left(h_1, h_2, h_3 \ldots, h_t\right). \tag{15}$$

Through the decoding function of the model, the data variables can be decoded, and the next syntax can be corrected by using the obtained results.

In this process, the required calculation formula is as follows:

$$y_t = \arg\max P\left(y_t\right), \tag{16}$$

$$y_t = \prod_{t=1}^{T} p\left(y_t | \{y_1, y_2, \ldots, y_{t-1}\}, C\right). \tag{17}$$

In the whole model, because the data length is too long, it may lead to information loss and other problems, which is not conducive to computer model calculation. Therefore, we introduce an intelligent learning system transformation mechanism to solve such problems. The model formula is as follows:

$$h_t' = f\left(h_{t-1}', y_{t-1}, C\right). \tag{18}$$

2.3. TDNN Model. For college oral English teaching, we also propose another spoken English recognition model, which is an evaluation estimation model connected with

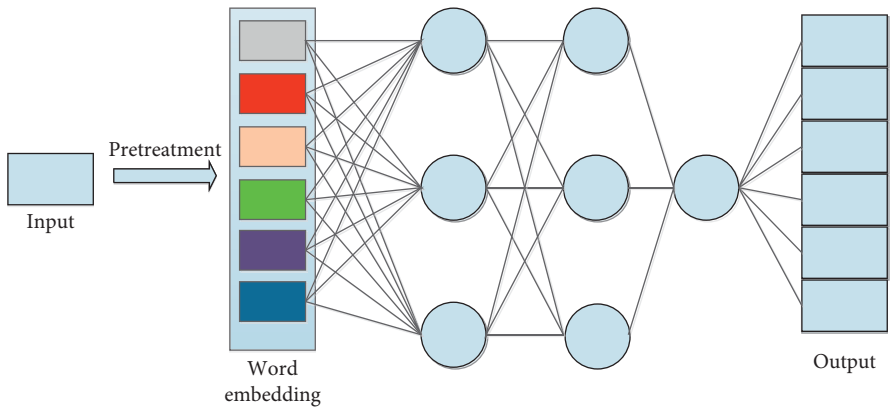

Figure 2: Structure diagram of the word embedding model system of neural network.

specific TDNN levels by previous feedback. The main way is to obtain more abundant context information according to the different performance characteristics of different target words in the TDNN layer, so as to reduce the number of model parameters, as shown in Figure 2 and Figure 3.

In Figure 3, T represents time and X represents the data state when the system enters the hidden layer at time H. The matrices W, V, and N represent the weight matrix, and its calculation formula is as follows:

$$h_t = fuc\left(Uh_{t-1} + Wx_t + b\right), \tag{19}$$

$$O_t = Vh_t, \tag{20}$$

$$C_t^* = \tanh\left(W_c x_t + U_c h_{t-1} + b_c\right), \tag{21}$$

$$c_t = f_t{}^{\circ}c_{t-1} + i_t{}^{\circ}c_t^*, \tag{22}$$

$$h_t = O_t{}^{\circ}\tanh\left(C_t\right). \tag{23}$$

Among them, f_t , i_t, and O_t are three valve controllers, and the valve control mechanism is a systematic method of information selection and differentiation. Its value range is between 0 and 1, so there is a certain information flow rate. D denotes the dot product operation of the matrix, and C is the time before the state of the memory cell.

In the literature on speech recognition, a time-delay neural network is proposed, which is a multilayer neural feedback system, and each layer has strong information extraction ability. In the process of machine learning, there is no need to mark and locate the learned ones. The training method of the neural network is backpropagation algorithm.

In the TDNN model, the model structure is similar to the traditional model, so the time complexity of a single convolution layer can be expressed as

$$Time \sim O\left(M^2 \times K^2 \times C_{in} \times C_{out}\right), \tag{24}$$

where M is the secondary side length of the feature graph output of each convolution kernel of the model and K is the main side length. As shown in the formula, enter C_{in}, output C_{out}, and convolution kernel K^2 are three influencing factors that affect the feature properties of the feature map:

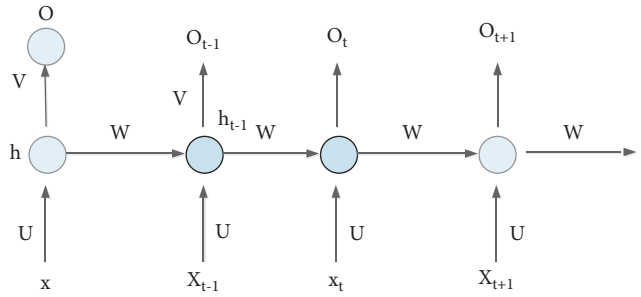

Figure 3: Single-layer RNN network structure diagram.

$$M = \frac{\left(X - K + 2^*\text{Padding}\right)}{\text{Stride} + 1}, \tag{25}$$

$$\text{Time} \sim O\left(\sum_{\rho=1}^{D} M_\rho^2 \times K_\rho^2 \times C_{\rho-1} \times C_\rho\right), \tag{26}$$

$$\text{Space} \sim O\left(\sum_{\rho}^{D} K_\rho^2 \times C_{\rho-1} \times C_\rho\right). \tag{27}$$

In many NLP-related tasks, the current high-usage approach is to construct a data dictionary in the dataset, known as a dataset. Each id of the data dictionary corresponds to a word. Input different ids will be converted into word vector sets corresponding to their ids, and then, all vector sets will be spliced. W is the size of the spliced word window. Therefore, in sequence t, we should enter the following format:

$$E_t = \left[e_{t-w}, \ldots, e_{t-1}, e_t, e_{t+1}, \ldots, e_{t+w}\right]. \tag{28}$$

Finally, a more accurate linearized probability distribution is obtained by using the activation function of the last layer of the neural network layer. In this experiment, we used the following objective functions:

$$L = -\frac{1}{N}\sum_{t=1}^{N}\sum_{c=1}^{C} y_t, c \log \dot{y}_{t,c}. \tag{29}$$

Thus, although the traditional RNN network model can process sequence data, it also has the problem of insufficient

Table 1: Student performance evaluation table.

Type	Group	Max score	Min score	Average score
Listening	Experimental group	98	82	88.3
	Control group	86	66	70.2
Speaking	Experimental group	93	81	87.5
	Control group	83	64	70.35
Reading	Experimental group	97	80	88.9
	Control group	80	63	76.2
Writing	Experimental group	94	78	86.3
	Control group	73	46	66.19

Table 2: Questionnaire survey results.

Type	Contents of the survey	Satisfaction (%)
Experimental group	Is there a new understanding of the world in connection with the international community	73
Control group		56
Experimental group	Satisfaction with one's own progress after learning oral English, listening, reading, and writing	85
Control group		76
Experimental group	Are you satisfied with your understanding of learning tasks	88
Control group		69
Experimental group	Satisfied with the diversity of English	82
Control group		62

long-term memory. Therefore, the TDNN model proposed by us can realize the input sequence in time, which greatly solves the problem of insufficient memory. TDNN model is a model based on BACK SPREAD algorithm, which is a fast algorithm and makes every layer of TDNN model have abstraction ability.

3. Experimental Simulation

3.1. Investigation and Analysis of College English Online Teaching Mode Based on Deep Learning. In a Chinese university, two classes were selected. Before entering the school, their overall English level was the same, and they were instructed by the same teacher. The control class was mainly taught by the teacher face-to-face, and the other experimental class was mainly learned online.

We used the experimental control method to verify the reliability of this method according to the final score and questionnaire survey.

It can be seen from Table 1 and 2 that the application of computer information technology in college English learning can help students to improve their enthusiasm for English, help them to have a further understanding of English, improve the basic English literacy of common

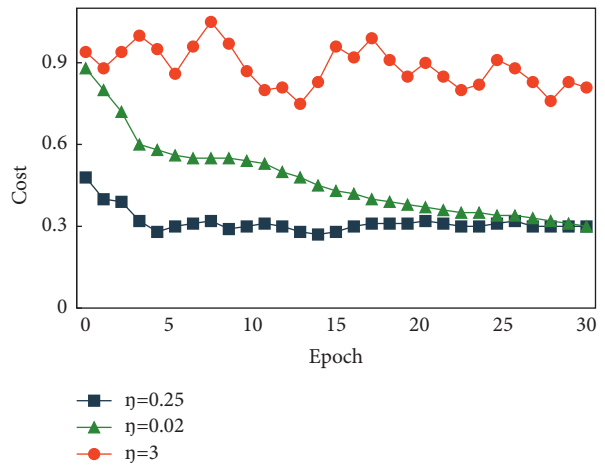

Figure 4: Test diagram of the first experiment.

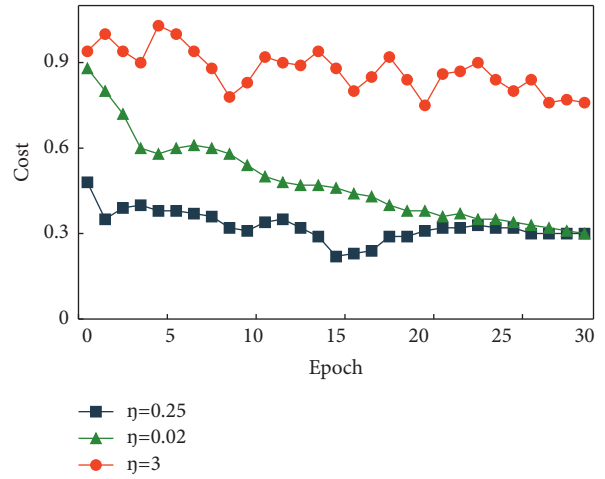

Figure 5: Test diagram of the second experiment.

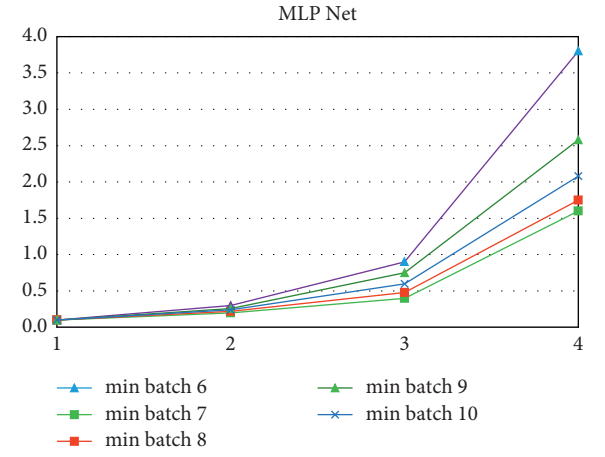

Figure 6: Gradient change diagram during MLP network training.

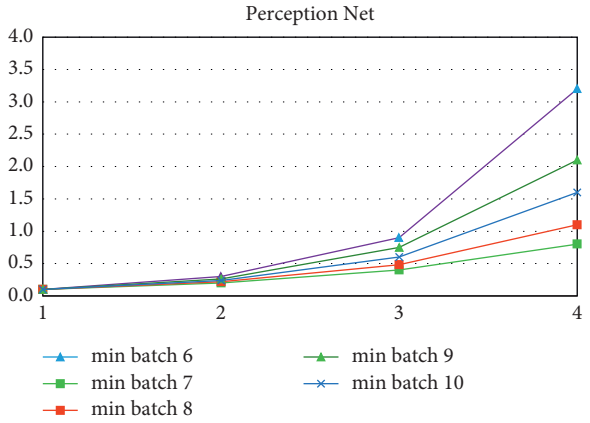

Figure 7: Gradient change diagram in the training process of perceptron network.

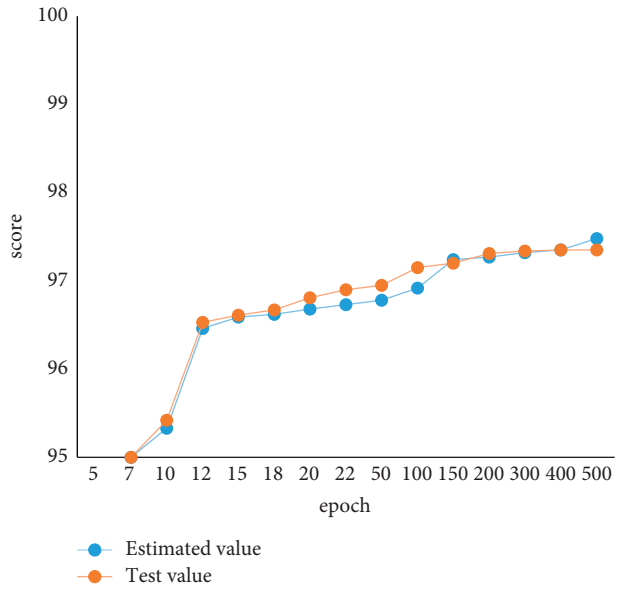

Figure 8: CNN gradient change diagram.

students, clarify the bad habits and tasks, and make students more targeted and clear when learning English.

3.2. Experimental Comparison Diagram. In order to reduce the error, we compare the learning parameters in MLP network and reduce the related neurons appropriately.

(1) Influence curve (different learning rates on network convergence): SGD algorithm is used to train parameters. In the dataset, the gradient changes of perceptron training and MLP training are compared.

(2) The gradient change diagram during the training process of perceptron network: CNN and MLP models are used to compare the experimental results in the verification set and dataset.

(3) Gradient change diagram of MLP network during training.

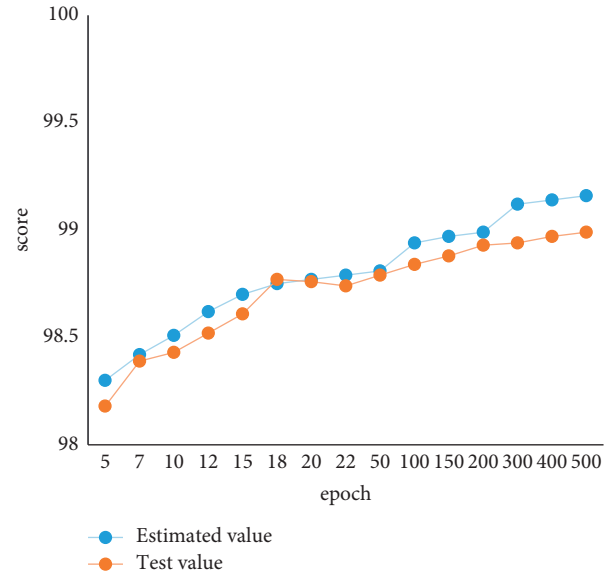

Figure 9: MLP gradient change diagram.

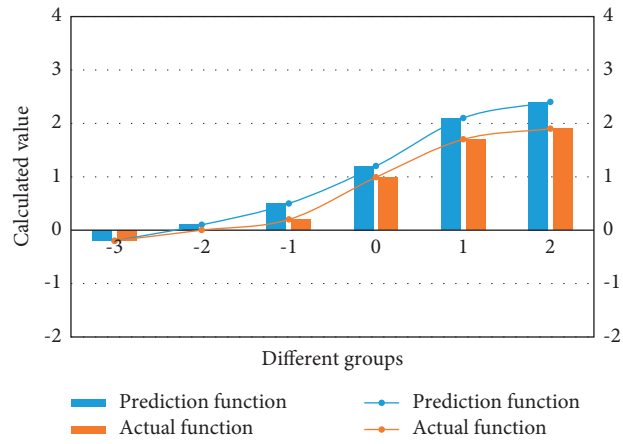

Figure 10: Column chart of S-type function prediction change.

Next, the recognition results of CNN and MLP on training set and test set are discussed and analyzed.

The data in Figure 4–9 show that it is useful to apply functions to deep learning and optimize the college students' English learning model. In the learning process, functions play a role and are effective for the blending of computer information technology and college English teaching.

3.3. Optimization Effect. By using progressive hidden layer element neural network, s-type recursive function is used to perform precise continuous operation. Using the weight matrix in each layer, the change of function value is predicted based on s-type function.

It can be seen from Figure 10 that the trend of this function is gradually rising, indicating that, under the traditional forward neural network, the operation of gradient function based on S-type will be more accurate. In order to improve the operation efficiency, the traditional S-type hidden layer unit neural network is increased, and the

number of layers and nodes in it is gradually increased, so the algorithm of GA-MLP-NN is optimized.

4. Conclusion

This study integrates computer information technology into college English teaching and proposes an optimized artificial intelligence algorithm. Ga-mlp-nn algorithm in spoken English correction program is optimized, and multilevel precise continuous operation is carried out by using progressive hidden layer unit neural network and S-type recursive function. The neural network model is constructed and evaluated. In order to establish a more complete learning system, experimental verification is designed to make it more convenient for students to learn English in college.

Data Availability

The experimental data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declare that they have no conflicts of interest regarding this work.

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