Optimization of English Language and Literature Teaching Management System Based on Artificial Intelligence and Computer-Aided Design

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Abstract. Computer-assisted teaching systems have been widely promoted in today's society, and teaching quality and efficiency have been improved. With the rapid development of artificial intelligence technology, it has also brought new strategies to the teaching management system, and intelligent technology can be integrated into the English language and literature teaching management system. This solves the shortcomings of traditional computer-assisted teaching systems, such as lack of intelligence, lack of teaching curriculum essence, and lack of human-computer interaction. This research combines the advantages of artificial intelligence technology and the advantages of computer-assisted teaching systems to optimize and predict the English language and literature education management system. For the recognition of image features in English language and literature, this paper adopts a convolutional neural network to predict, and extracts features from long and short memory loop neural networks that have time characteristics such as English vocabulary or sentences. And some statistical parameters related to prediction accuracy are used to explore the accuracy and generalization ability of the model in this paper. The research results show that the artificial intelligence neural network proposed in this paper has high accuracy in the application of English language and literature teaching management system, and its prediction error is only 2.38%.

Keywords: Artificial Intelligence; English Language and Literature; Teaching Management System; Time Characteristics

1   INTRODUCTION

Since the beginning of the 21st century, with the continuous development of science and technology, the teaching mode of English language and literature or other educational management modes have undergone significant changes. Computer-assisted system has been widely used in English in the field of teaching management, and it has changed the traditional teaching management model, it is no longer a single way of imparting knowledge through books. And it has a profound impact on the education and teaching process as well as the knowledge received by students [1]. Computer-assisted teaching management system can not only provide richer knowledge than traditional book-based teaching methods, but also stimulate students' interest in learning and knowledge and improve their learning initiative. For example, the traditional way of teaching English is only the understanding and memorization of vocabulary, grammar, and sentence patterns. The computer-assisted teaching system can not only provide correct pronunciation and real English language environment, it is very meaningful for improving students' interest and comprehension ability. The computer-assisted teaching system can integrate actual communication methods and customs into the teaching management system, which will greatly improve students' acceptance and learning interest. This is meaningful, especially for elementary school students and even middle school students. Similarly, the computer-assisted teaching system has been developed rapidly in recent years and it has produced a good teaching effect.

Although the computer-assisted system has changed the traditional teaching management model and produced some better teaching effects, it has been adopted by most students in the classroom. But the computer-assisted system also has many problems in the teaching management system. For example, it cannot interact well with students, and it is a closed-loop management system. It is only the output generated from the content input by the teacher, and cannot generate more knowledge needed according to the real-time needs of the classroom. The traditional computer management system lacks a certain degree of intelligence [2]. Because it is a closed-loop teaching management information model, it only produces some known teaching knowledge, which leads to the lack of intelligence and lack of certainty in the computer-assisted management system. Initiative. Moreover, the current computer-assisted teaching system only runs in a stand-alone environment, which leads to the inability to make full use of the Internet to generate new teaching content. At the same time, under the traditional computer teaching management mode, teachers cannot interact well with the powerful functions of computers or the Internet. The shortcomings described above are in the computer-aided teaching management system, which has restricted the rapid development of the computer-aided system, and it also restricted the further improvement of the teaching management model. The development of artificial intelligence technology has brought new opportunities and new models to the computer-assisted management teaching system.

With the improvement of computer computing power and the rapid development of hardware systems, artificial intelligence technology has developed rapidly in recent years. It is an autonomous learning and highly intelligent technology, which may bring new ideas to the traditional computer-assisted education management model. Artificial intelligence technology can be combined with the powerful Internet to bring new knowledge to teaching, it can also improve the activity of the classroom and the initiative of students, and can continuously stimulate good interaction between teachers and students according to the classroom atmosphere. This article combines artificial intelligence technology and the demand in English language and literature teaching management to research and optimize the intelligent English teaching mode.

2 RELATED STUDIES

Almusharraf and Alotaibi [3] used human evaluation and computer-assisted error-finding methods to study gender differences in the process of English language learning, and concluded that there is no obvious difference between males and females in accepting English language. At the same time, a diagnostic model of EFL writing error information is proposed. Shadiev et al. [4] has used speech recognition to text recording technology STR and computer-assisted translation system CAT to study the communication problems of multilingual students in cross-cultural communication. The accuracy of multilingual translation has been studied by computer-aided translation systems. Li [5] developed a new type of English learning system based on the auxiliary hierarchical neural network method (IF-HNNS), which aims to improve the quality and level of English teaching. This English learning system is a continuously updated computer-assisted teaching system based on the Internet, which realizes the human-computer interaction function in English teaching. Based on the machine learning system of fuzzy mathematics, Wu [6] proposed a semi-automatic evaluation system for translation accuracy, and explained the advantages, principles and disadvantages of computer-aided translation systems and multimedia interactive systems. Hai [7] proposed a SVM_FF English classifier, which is based on English syllables and prosody to realize automatic recognition of spoken English. At the same time, combined with the automatic classification method proposed in this paper and experiments for verification and analysis, this SVM-FF classifier has better accuracy for the classification of spoken language than traditional computer-aided methods. Li [8] used the analytic hierarchy process to study the role, influencing factors and existing problems of computer-aided systems in teaching management, which has certain guiding significance for the application of computer-aided systems in teaching management. Through the research in recent years, it can be found that many studies have been carried out on the combination of English language teaching and research fields and computer-assisted systems, which have also promoted the improvement of English teaching [9]. Compared with manual processing of English grammar or multilingual spoken language recognition problems, computer-assisted systems have higher efficiency and better accuracy, but computer-assisted systems also have many problems in English teaching management [10]. The combination of artificial intelligence technology and computer-aided systems may lead to better innovation and development. It can make the application of computer-assisted system in English language and literature teaching management more intelligent and realize better teaching resources to be obtained on the Internet.

This article combines artificial intelligence technology and traditional English language and literature teaching computer-assisted system for some attempts and predictions. The main application areas of artificial intelligence technology are image recognition and language recognition, etc. Some advantageous algorithms have emerged, such as convolutional neural networks, long and short memory cyclic neural networks, etc. The classroom interaction that exists in the management of English language and literature teaching can predict and automatically generate interactive knowledge based on the expressions and speech of students and teachers. It can also extract and predict temporal features based on the content of the dialogue between students and teachers, and then generate the results that are consistent with the classroom. Content video or animation, etc., which will stimulate students' interest and initiative in learning English. According to the above proposed research content, this article is mainly divided into five parts. The first part introduces the advantages of combining English language and literature teaching management system with artificial intelligence, and the second part explains the current research status of English language and literature computer-aided systems. The third part is the neural network algorithm to be used in this article. The fourth part is the accuracy and feasibility study of the new intelligent English teaching model proposed based on the current research status. The fifth part is mainly to summarize the advantages and feasibility of the combination of computer-assisted English language and literature teaching system and artificial intelligence.

3 THE INTRODUCTION OF ARTIFICIAL INTELLIGENCE METHOD IN ENGLISH LANGUAGE AND LITERATURE TEACHING MANAGEMENT SYSTEM APPLICATION

3.1 Artificial Intelligence Method for Facial Expression Recognition

Under the computer-aided design system, the teaching management mode of English language and literature is generally that the teacher transfers the knowledge to be imparted to the students through a stand-alone system. The first one studied in this paper is currently the English language and literature teaching management model that combines the advantages of artificial intelligence and computer-assisted systems to achieve human-computer interaction. Convolutional neural networks are used to recognize the expressions and actions of students and teachers in the classroom. The convolutional neural network implements Internet knowledge and interaction recommendations based on these expressions and actions. A separate computer-aided design system is only the teacher's input knowledge and the output function of the courseware, and cannot realize the functions of real-time interaction and innovative classrooms. This article intends to combine the advantages of convolutional neural network in image recognition to realize the interaction in the management of English language and literature teaching.

The teaching of English language and literature is different from other types of teaching classrooms. It contains many mouth shapes, speeches, expressions, etc. of students and teachers. For artificial means, it is difficult to find the connection. However, convolutional neural networks have unique advantages in processing these spatial features, and can fit these complex nonlinear relationships and make better predictions. Convolutional neural network is mainly composed of convolutional layer, pooling layer, activation function, etc. It realizes the function of weight sharing and parameter reduction. Compared with traditional fully connected neural networks, this allows deeper networks to be built. In the process of English language and literature teaching, the mouth and body movements of students and teachers contain a large number of features and are complex and changeable, which requires a deeper convolutional neural network to achieve. The computer-assisted teaching system can provide a visual interactive interface for the realization of artificial intelligence. The information from other channels such as processed by convolutional neural network can be reflected through the existing computer-aided design system to further realize the interaction of the English language and literature teaching class.

The Figure 1 shows the flow of interaction between convolutional neural networks and computer-aided design. First, the mouth shape and body movements of students and teachers are used as the input layer of the convolutional neural network. Then, the convolutional neural network extracts expression features through convolution operation and sampling of the pooling layer. Finally, a fully connected layer will map the features into information that can be received by the computer-aided system. Because the Internet contains a lot of information and English language and literature teaching resources, and the mouth expressions and body movements of students and teachers have a certain non-linear relationship, this makes full use of the advantages of convolutional neural networks. Once the relationship between the expressions and body movements of students and teachers and the output of English literature types is established, the computer-aided design system and the Internet system can interact in real time based on the expressions issued by students and teachers. It will truly achieve vividness and Interested English language and literature teaching class.

3.2 Artificial Intelligence Technology of English Language Literature Temporal Features

The teaching management of English language and literature is a piece of information with time characteristics. It not only contains the recognition tasks of the facial expressions and body language of students and teachers. The English language is a task closely related to time. Each student or teacher expresses the English language contains time correlation before and after.
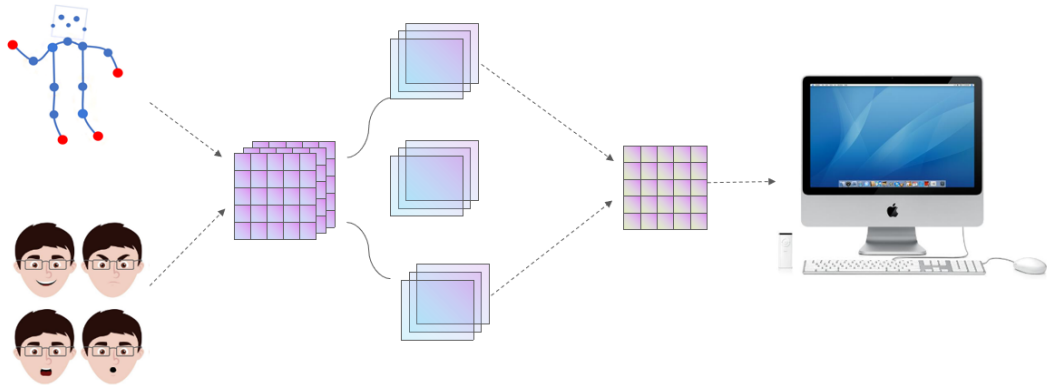
Figure 1: Convolutional neural network and computer aided design interaction process.

Similarly, for the computer-assisted English language and literature teaching management system, to achieve real-time interaction and real-time update of courseware content, this requires the support and learning of historical English literature information. The long and short memory loop neural network has obvious advantages in extracting time features. For example, the computer-assisted system can provide a series of responses based on students' language expression in real time, introduction of literary background, or the customs and customs of literature, which can not only increase students' interest in English literature, but also increase their acceptance.

The difference between long and short memory neural network and convolutional neural network is that it can selectively input and retain historical information. This is the function of the gate structure. For example, when a student mentions the content of ongoing English literature, the long and short memory neural network can memorize the literary content mentioned by the student during this period, and then match it according to the trained model and the relevant stored English literature knowledge on the Internet, and then can get real-time literary knowledge in English teaching courses. Through this neural network prediction method, the problem that the traditional computer-aided design system cannot update the classroom content in real time can be changed. Teachers can roughly design the content of the English literature teaching class. In actual teaching, the real-time update of the courseware content can be achieved.

The Figure 2 shows the flow of the computer-aided design system and the long and short memory loop neural network. First, the grammar and sentences contained in English literature are used as the input layer of the neural network, and then the long and short memory neural network is extracted and iterated to obtain the optimal weight information. Once the optimal weights and bias coefficients are obtained, this algorithm can be transplanted to a computer-aided system. With the help of the Internet, real-time updates of English language and literature teaching courseware will be realized, and the intelligence of English language and literature teaching will be truly realized. Finally, the computer-assisted system will display real-time English language and literature required literary background and customs and other information, which is meaningful for improving the quality of the classroom. Finally, under the combined action of convolutional neural network, long-short memory neural network and computer-aided system, it will realize the intelligence of English language and literature teaching management system.
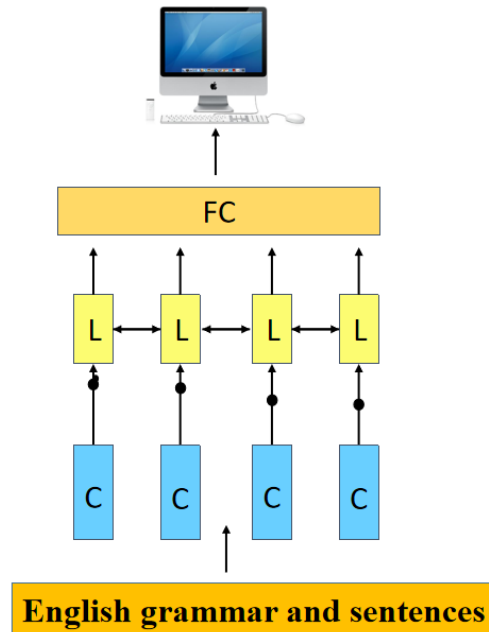
Figure 2: The process of computer-aided design system and long and short memory loop neural network.

3.3 Data Preprocessing and Standardization

The input layer of the convolutional neural network is derived from the body movement information such as mouth shape and expression of students and teachers. This requires preprocessing the data into the matrix form required by the convolution operation and cannot directly input this information into the convolution Neural Networks. Because they are quite different in magnitude, this will cause uneven distribution of weights, which will eventually lead to a large difference in the accuracy of the prediction results. Therefore, for the neural network training stage, the preprocessing of data features is important and necessary in order to improve the accuracy of predicting student expressions and other body language.
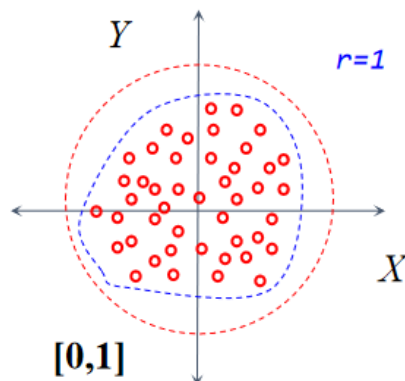

Figure 3: Data standardization processing method.

The Figure 3 shows the effect of data set standardization. The purpose of the data preprocessing and standardization process in this paper is to process the input data into an input form that conforms to the normal distribution, and all of them are in the interval [0,1]. The collected body movements such as mouth shapes and expressions of students and teachers are classified and assigned a certain range of characteristics, and then these characteristic values are processed into data conforming to the normal distribution. This will not only speed up the convergence speed of the convolutional neural network but also improve the accuracy of the model. In the end, the model studied in this article will display the predicted value on the computer-assisted English language file education management system in real time for students and teachers to use for dynamic learning.

4   RESULTS AND DISCUSSION

4.1   Analysis of Convolutional Neural Network Prediction Accuracy

In this study, five expressions and body movements were selected as the input parameters of the convolutional neural network. These five expression parameters were marked as five features after data preprocessing. The Figure 4 shows a fan chart of the proportion of student expressions. On the whole, the collected student facial expressions and other body movements have a relatively small gap, which will benefit the distribution of weights. The largest proportion of expression categories reached 25.3%, and the smallest proportion reached 13.2%. Relatively speaking, this is a reasonable way to get data sets. For example, when the frequency of an expression is low, the number of its types can be appropriately reduced in the subject of English literature teaching, which has a greater possibility to improve the accuracy of common expressions.
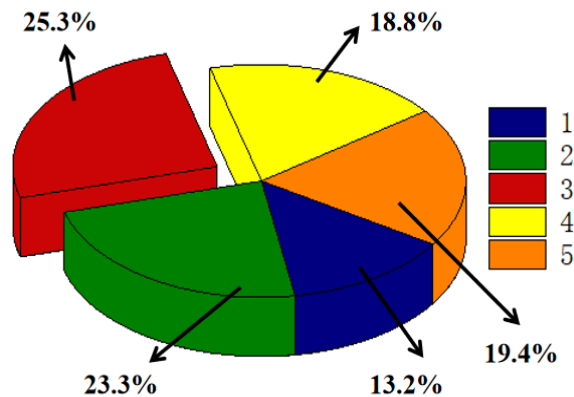

Figure 4: The proportion of students' facial expressions.

In order to more intuitively verify the feasibility and accuracy of the convolutional neural network in English language and literature teaching, The Figure 5 shows the cumulative value of the error of the predicted value and the error proportion. In general, it can be seen intuitively from Figure 5 that the convolutional neural network suggests a good mapping relationship between student expressions and interactive knowledge of English literature. The maximum prediction error is only 1.78%, which is a good error range in the English language and literature teaching management system. The smallest error is only 0.92, and most of the errors are concentrated within 2%. Within this error range, the convolutional neural network model has great confidence to predict the English literature teaching environment required by students and teachers based on their facial expressions and body movements, and the corresponding output is carried out through the computer-aided design system. The uneven distribution of errors may be due to the different

number of student expression categories collected in the data set, which leads to inconsistent weights in different expression categories. In practical applications, engineers can collect more types of student facial expressions and other body movements according to the characteristics and requirements of each English literature, and further enrich the characteristics of the data set, making the English literature computer-aided design system more intelligent. At the same time, the accuracy of each expression can also be clearly seen through the variation of the cumulative curve of the error. Generally speaking, the artificial intelligence method has high accuracy in the management of English language and literature teaching, and it matches well with the computer-aided system.
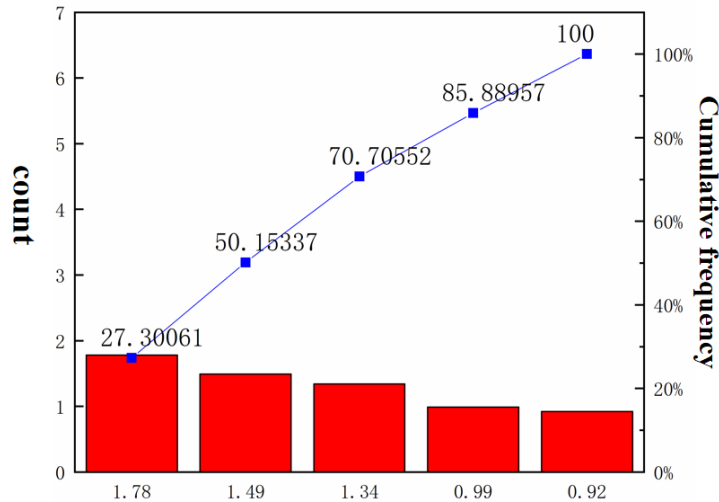

Figure 5: The cumulative value of the error of the predicted value and the error proportion.

4.2   Analyze the time Characteristics in English Language and Literature Teaching

The long and short memory neural network is used to predict the temporal characteristics of English literature, such as English grammar and sentences. The Figure 6 shows the predicted and true values of sentences and grammar in English literature at different moments in a class. In general, the gap between the predicted value and the true value of English sentences is relatively small, which generally meets the requirements of English language and literature teaching. Although the errors at different moments are different, some are larger and some are smaller, the overall output meets the teaching requirements of English literature classes. It can also be clearly seen from the green area in Figure 6 that most of the errors are within 2%, but the error is slightly larger at the last moment of each lesson. This may be caused by the accumulation of errors over time. At the same time, for English language and literature teaching, the last moments of the class are quite random, which is also difficult to predict. In order to improve the prediction accuracy of the entire English literature class, more time features can be provided at the last moment to improve the fitting ability of the neural network.

The Figure 7 shows the box distribution diagram of the predicted value and the true value. Generally speaking, the predicted value of English literary sentences is smaller than the true value, but the error is relatively small. First of all, it can be clearly seen from the box distribution map that the distribution of the true value is not very uniform, because its mean value is on the lower side of the box, which shows that most of the samples are small values. As for the predicted value, the distribution is relatively uniform, and the average straight line is basically distributed in the central part of the box. Judging from the distribution of the boxes, the mean value is relatively close to the predictions for other values.
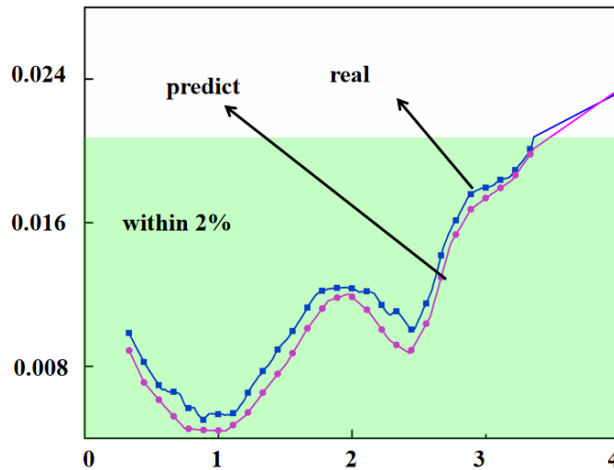
Figure 6: Comparison curve of predicted value and true value.

At the same time, the larger part of the error is distributed on the lower side of the box, that is to say, the smaller value has a larger error. In general, this error is sufficiently convincing for the prediction of the English language and literature education management system.
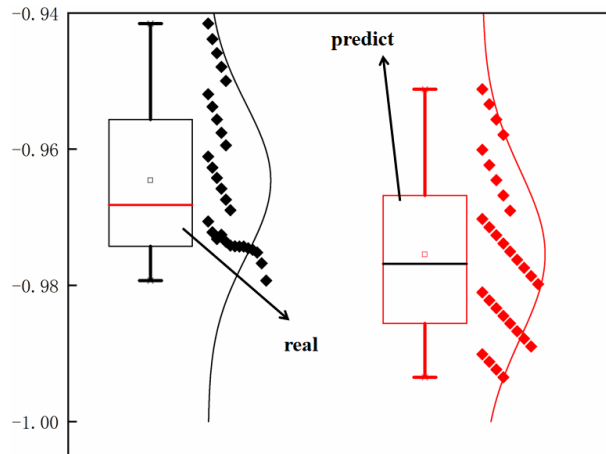

Figure 7: The box distribution diagram of the predicted value and the true value.

In order to better quantify the distribution of prediction errors, The Figure 8 shows the distribution of the mean and range values of the predicted value. In general, the predicted value deviates from the mean value in a small distance, which shows that the predicted value is also the feature value of the English sentence that is in good agreement with the true value. The extreme value can reflect the uncertainty of the prediction to a certain extent. It can be seen from Figure 8 that the fluctuation of the extreme value is relatively small, and they are relatively close to the extreme value label, which shows that the predicted value is more credible.
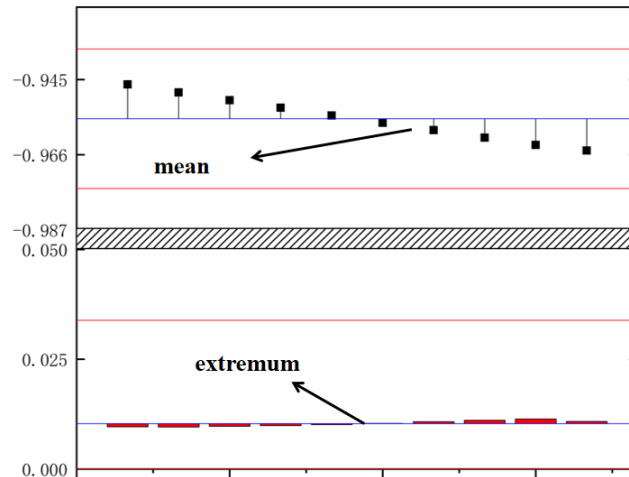
Figure 8: The distribution of the mean and range values of the predicted value.

5   CONCLUSION

Although the application of computer-aided design system in English grammar teaching management system has achieved better results and efficiency for students and teachers. However, the current computer-assisted English language and literature education management system still has major problems, such as lack of intelligence, inability to interact in real time, and only a single output courseware. With the rapid development of artificial intelligence technology, many algorithms that can process nonlinear relational data have been produced, which brings new directions for the intelligent optimization of the teaching management system of computer-aided design systems. This article mainly combines artificial intelligence technology and the visualization function of the computer-aided design teaching system to predict the body language such as facial expressions in English language and literature and the dynamic performance of English literature sentences. The prediction of the mouth shape and body language of students and teachers uses convolutional neural network, and its prediction value is in good agreement with the real data. The maximum error is only 1.78%, and all errors are within 2%. For data with temporal characteristics in English language and literature teaching, such as English sentences, the predicted value and true value are in good agreement with the time trend, which shows that the long and short memory neural network is suitable for extracting the time that exists in the management of English language and literature teaching. The combination of artificial intelligence and computer-aided design system will not only improve the intelligent process in English language and literature teaching, but also improve the vividness of the classroom.

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