

## Research Article

# A Mobile Terminal-Based College English Teaching Evaluation Method

**Gao Lili** 

*Tangshan Vocational and Technical College, Tangshan 063000, China*

Correspondence should be addressed to Gao Lili; [t21714002@stu.ahu.edu.cn](mailto:t21714002@stu.ahu.edu.cn)

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At the moment, the existing teaching evaluation system cannot be used for wireless data input and reception, limiting the system's application scope and making it less practical. As a result, a new system for evaluating college English teaching is being developed using a mobile terminal. The English teaching quality model is constructed using the Internet of Things mobile platform, and the network teaching structure is analyzed using the model parameters to monitor and control the teaching progress. A classification and evaluation system will be established in conjunction with the campus network and intelligent sensor networking technology. The development environment and overall design of the mobile terminal are used to create an evaluation system for English teaching in an Internet of Things environment. Create the critical architecture based on the B/S model. In the section on system software design, we mine data from English teaching resources, evaluate students' progress toward English proficiency, and use convolutional neural networks to evaluate the quality of English teaching. The teaching results are output according to the distribution of convolutional layers, allowing us to analyze the level of English instruction in colleges and universities. Comparative experiments demonstrate that this research system has a higher information query efficiency, a lower convergent error of 4 ms, and a higher evaluation accuracy for oral English, English writing, and English reading.

## 1. Introduction

With the development of big data processing technology and mobile communication technology, network teaching in mobile terminal environment has become an important trend of teaching development in the future. Classifying and evaluating the network teaching quality by using the mobile terminal platform and combining the big data clustering processing and information fusion technology, realize the classification and evaluation of the network teaching quality in the mobile terminal, construct the classification and evaluation system of the network teaching quality, improve the information management ability of the classification and evaluation of the network teaching quality, and study the optimization design method of the classification and evaluation system of the network teaching quality, which is of great significance in promoting the teaching management and teaching reform and optimization [1]. The design of network teaching quality classification and evaluation system of mobile terminal is based on the statistical analysis of

big data of teaching evaluation. It is necessary to optimize and cluster the statistical information of network teaching quality classification and evaluation. It is necessary to integrate the clustering characteristics of data to schedule and identify the network teaching quality classification and evaluation system of mobile terminal so as to improve the ability of classification and evaluation of network teaching quality and statistical analysis [2].

Reference [3] constructs the evaluation system of network experimental teaching. Using data mining technology to design the network experimental teaching evaluation system, so as to mine the valuable information in the network experimental teaching as the original data. Use data mining to collect the original data in teaching, analyze the teaching results according to the data representation, achieve a reasonable and effective management network platform, and finally achieve the purpose of improving the quality of talents. Reference [4], scholars put forward that CIPP education evaluation model is naturally consistent with practical education in application-oriented universities.

Based on considering the diagnostic and process evaluation needs of practical teaching in application-oriented universities, this study selects CIPP model to establish a systematic analysis framework of “background input process achievement” and uses Delphi method and analytic hierarchy process to follow scientific principles. Based on the principle of integrity and comprehensiveness, build an application-oriented undergraduate college practical teaching evaluation system with evaluation effect and promote the effective development of practical teaching evaluation. Reference [5] designs a teaching enhancement system based on numerical optimization. Numerical optimization is a widely used but abstract course. The interactivity and immersion of augmented reality technology can help the teaching of numerical optimization. Based on the lack of such applications, an interactive light augmented reality teaching system for numerical optimization teaching is studied and implemented. The system uses aruco algorithm for multitarget tracking and recognition, realizes the simulation and visualization of numerical optimization process based on javascript technology, and designs and develops a prototype augmented reality system.

However, the systems designed in the above literature cannot be applied to wireless information input and reception, resulting in small application range and poor practicability. Therefore, a new college English teaching evaluation system based on mobile terminal is designed. The purpose of this paper is to compile data from the English online network assessment module, which consists of a forum, a course, homework, a resource, a user message, and a chat room. Select a semester of online video teaching teachers and students from the forum to participate in discussions about the completion of student work, resource browsing times, and online video exchange between teachers and students to begin collecting experimental data.

## 2. Design of College English Teaching Quality Evaluation System

*2.1. Overall Design Framework and Development Environment Description of the System under the Mobile Terminal.* In order to optimize the design of the network teaching quality classification and evaluation system, a mobile terminal platform [6, 7] shall be established under the environment of the Internet of Things, and a three-layer control structure model of the network teaching quality classification and evaluation system shall be established in combination with campus network and intelligent sensor network technology, namely, the data collection layer, the intelligent information processing layer, and the human-computer interaction application layer of the network teaching quality classification and evaluation system in the mobile terminal. In combination with the big data information fusion and fuzzy control processing [8, 9], the artificial intelligence technology shall be adopted to optimize the design of the network teaching quality classification and evaluation system under the mobile terminal, and the information integration and processing module shall be established to carry out the information fusion and optimization design of the

distance network teaching so as to improve the netting performance and data optimization collection capability of the network teaching quality classification and evaluation system under the mobile terminal.

The network module of the system adopts the Internet, GPRS, and WiFi for network communication, the information processing layer adopts the sensor array to collect the original data of the network teaching quality classification and evaluation system under the mobile terminal, and combined with the big data processing technology realizes the parameter identification and control instruction transmission of the network teaching quality classification and evaluation system under the mobile terminal. According to the parameter characteristics and instruction content, the overall structure of the teaching quality classification of the mobile terminal platform is constructed, as shown in Figure 1.

According to Figure 1 on the analysis of the system overall design framework, this paper mainly includes the design of the system with the AD module, data fusion module, mobile terminal data scheduling module, teaching evaluation information preprocessing module, and resource scheduling module, etc., using big data fusion scheduling method for mobile terminal network teaching quality classification assessment of the adaptive scheduling and learning algorithm is designed, realize the classification evaluation of mobile terminal network teaching quality. The network communication protocol based on ZigBee is established in Ethernet [10, 11] to realize the network design and bus transmission control of the mobile terminal network teaching quality classification evaluation system and the development and design of the mobile terminal network teaching quality classification evaluation system under the embedded ARM and Linux environment. The functional structure of the network teaching quality classification evaluation system based on mobile terminals is shown in Figure 2.

*2.2. Framework of College English Teaching Quality Evaluation System.* B/S mode has the advantages of low cost, convenient maintenance, strong distribution, simple development, convenient operation, zero client maintenance, and strong scalability. Therefore, the B/S model can be used to construct a quality evaluation system for English teaching in colleges and universities, as shown in Figure 3. The constructed college English teaching quality evaluation system has the following advantages: it is convenient for different types of users to operate, online evaluation can be completed in a short time, and system maintenance is convenient. The client, application unit, and database are three important parts of the system. The client includes five types of users, including supervisor, administrator, teacher, audit administrator, and student. The operation interface of different types of users is combined with the browser to display page operation and other contents. The application unit of the system covers five aspects: user management, online evaluation, data management, evaluation results query, and college English teaching quality analysis. Finally,

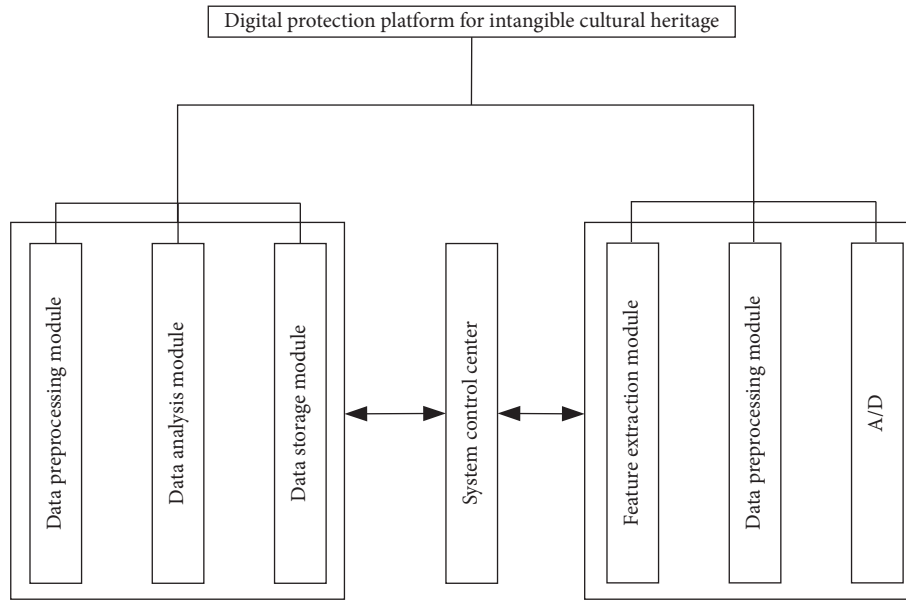


FIGURE 1: Overall design framework of the system.

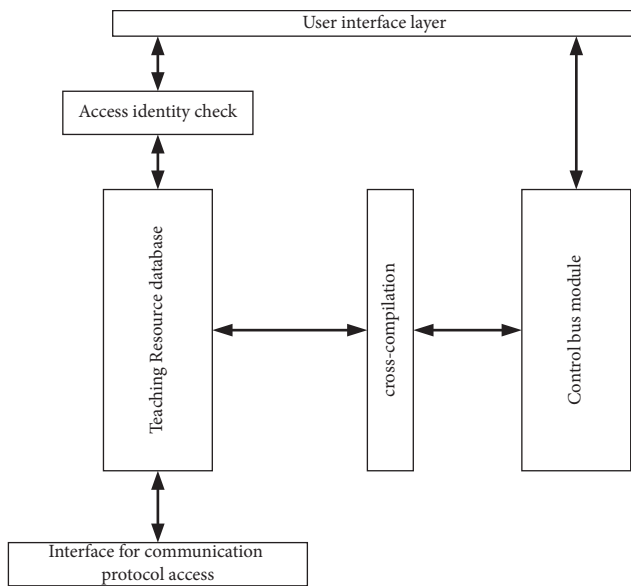


FIGURE 2: Functional structure of the network teaching quality classification evaluation system in mobile terminals.

college English teaching quality evaluation index data, evaluation subject, and object data are stored in the database.

### 2.3. Application Unit Design

(1) User management unit. The user management unit is divided into two aspects: system login and security management. Different types of users log in to the college English teaching quality evaluation system according to the entrance of different units, and users perform operations in their respective permission pages. Considering the security of user information, users are divided into five types: college English

teaching supervisor, audit administrator, administrator, teacher, and student.

- (2) Online evaluation unit. The permission opening time of this unit is generally the end of the semester or the special use period, and the permission of college English teaching quality evaluation is opened by the management authority. There are user identity restrictions in the online evaluation unit. After logging in to the user interface, the user enters the interface with different permissions. That is, the audit administrator can audit the input data and effectively manage the database. Students only have the authority to evaluate teachers' teaching quality and their own learning effect. The system will automatically provide the content to be evaluated after identifying the user information of students, and students will input the relevant content of college English teaching quality evaluation according to the actual situation. When each user is in a different interface, the college English teaching quality evaluation index system of the system database provides the user with the content to be evaluated intelligently. The composition of online evaluation units is shown in Figure 4, which indicates that the subjects of college English teaching quality evaluation are students, teachers, and experts.
- (3) Data management unit. In the data management unit, the English teaching quality evaluation data can be integrated and processed, the effective evaluation information data can be shared and utilized, the invalid information data can be screened and eliminated, and the control effect of the teaching evaluation data can be improved. The control content is two aspects: one is to manage and integrate the internal English teaching evaluation index data of the system and update the

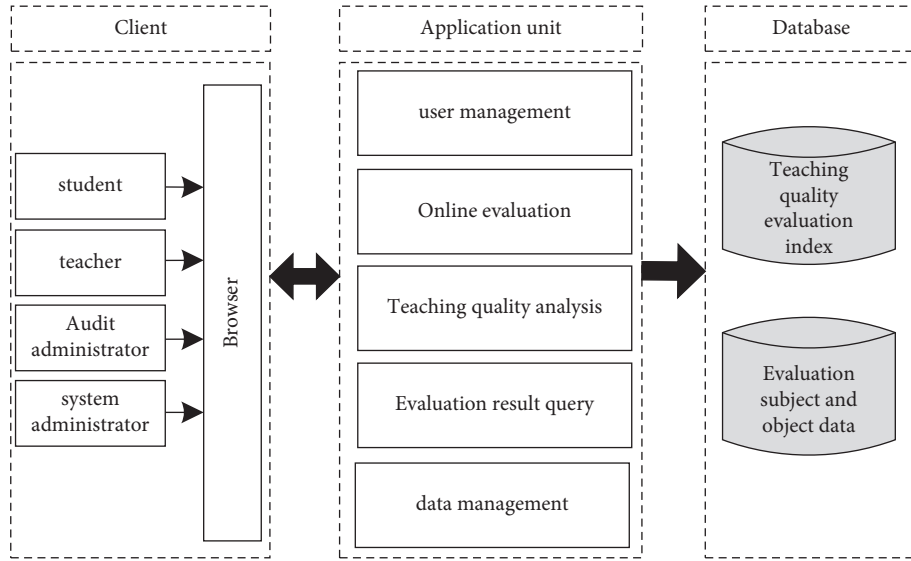


FIGURE 3: College English teaching quality evaluation system.

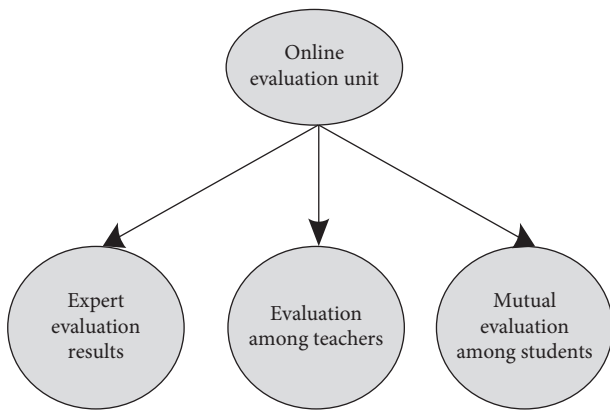


FIGURE 4: Composition of online evaluation unit.

specific evaluation information in time and the other is to manage the basic information of students and English teachers, such as students' English learning situation, learning progress, etc., teachers' teaching methods and teaching effects. Data can be modified and deleted in this unit.

- (4) Evaluation result query unit. In the query unit, different types of users can obtain the evaluation results of college English teaching quality and query basic information such as courses. When users query the evaluation results of college English teaching quality, they can learn about courses and other related information, which provides favorable conditions for the management evaluation process. By querying the evaluation results, students can understand the teaching quality of college English teaching and help students to make objective evaluation of teachers. Teachers analyze the advantages and disadvantages of College English teaching according to different courses and scores of English

teaching in different colleges. Administrators can not only query the above two contents but also have the authority to query the background data, so as to provide teachers with the correct basis for optimizing the quality of College English teaching.

- (5) College English teaching quality analysis unit. System of college English teaching quality analysis module based on deep learning algorithm to learn college English teaching quality after the analysis of samples, to analyze the problems existing in the English teaching quality in colleges and universities, and gives the corresponding optimization proposal, the advantage of this feature is the system without having to spend a lot of artificial and time analysis of teacher's college English teaching quality.

#### 2.4. Software Design of College English Teaching Quality Evaluation System

2.4.1. Data Mining in English Teaching. The core of the design of the online evaluation system is the selection of knowledge base, which is a regular assembly that can mine different effective data and adopt data mining algorithm based on data entropy [12].

If  $Q = (A)$  is the data system of an information,  $A = \{a_1, a_2, \dots, a_m\}$ , and  $q$  is the coefficient of the data system, we can get

$$A \in \frac{Q\{q\}}{E}, \quad (1)$$

$$E = \sum_{i=1}^n q \log Q(a').$$

Then, the data mining information result of object  $a$  relative to data entropy  $E$  is as shown in the following:

$$E = \frac{\mathfrak{R}_a(E)}{\mathfrak{R}(E)} \quad (2)$$

In the formula:  $\mathfrak{R}(E)$  is the entropy coefficient of  $E$  and  $\mathfrak{R}_a(E)$  is the information entropy of  $E$  after data mining object  $a$ .

With the deepening of data mining, the knowledge base will continue to add new rules to restrict the intelligence of the system. The design of information mining based on data entropy can not only show the method in the form of knowledge base but also analyze the excavated data results.

**2.4.2. Learning Progress Evaluation.** In order to realize the design of online evaluation system software, we must follow three basic principles: standard system, data number, etc; each student's learning progress can only be assessed after a system memorandum has been made; the system memorandum stores data on the student's learning progress, which is mined; the mined data are standardized to some extent, traced back to the data source, and the initial value of the online assessment is obtained through analysis [13, 14]; and the final value is determined for online assessment.

The specific software design process is shown in Figure 5.

For the collection of software design data, the graph generation algorithm can be used:

Let the collected data information be  $J$  and the storage speed be  $V$ ,  $x_1, x_2, x_3, x_4, x_5, x_6$  are the learning progress of students, respectively, from which the attributes of information  $a, b, c$  can be obtained:

The model functions of software design based on attributes is shown in the following:

$$Q = \frac{|V| \cdot \sum_{i=1}^k J_a\{x_1, x_3, x_5\} J_b\{x_1\} + \sum_{i=1}^k J_b\{x_6\} T_c\{x_3, x_6\}}{3} \quad (3)$$

The model function is designed to ensure the smooth storage of data, and its space size must be designed according to the model function, which includes various coding mechanisms for real agents. The software design of online assessment not only establishes a supervision mechanism for the network distance education under the condition of big data but also ensures the progress of learning.

**2.5. Output of Evaluation Results of College English Teaching Quality Based on Convolutional Neural Network.** The intrinsic law and representation hierarchy of learning sample data are the function of deep learning. Therefore, the deep learning algorithm can be used to construct a convolutional neural network model, and the teaching evaluation index can be used as the evaluation basis of the model to analyze the quality of English teaching in colleges and universities [5, 15, 16]. First, the actual situation of college English teaching is obtained through the model; second, the deep learning training samples are established according to the teaching evaluation indicators, and the teaching quality evaluation samples are obtained; finally, the test sample is input to start the

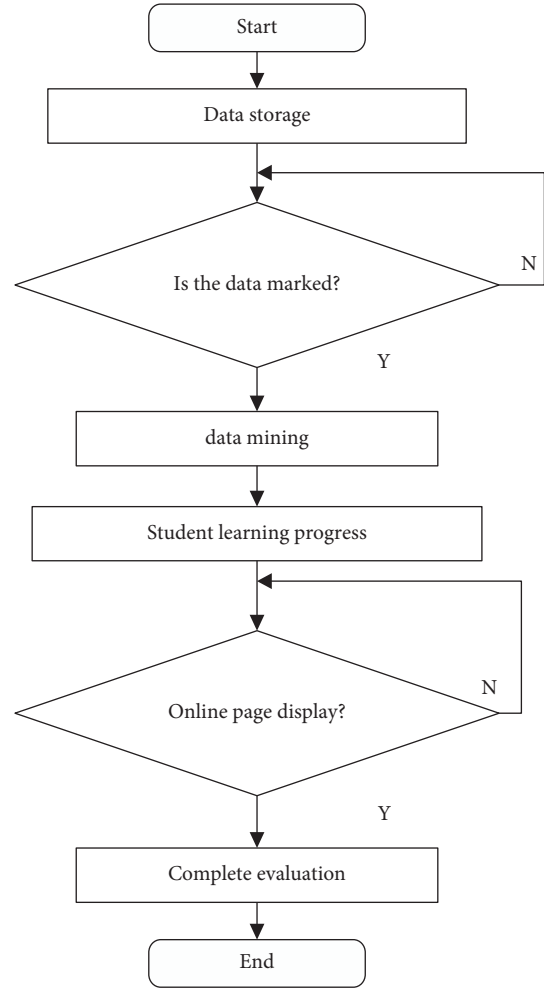


FIGURE 5: Software design flow chart of learning progress.

evaluation and analysis of college English teaching quality. The process is shown in Figure 6.

After constructing the analysis model of English teaching quality, it is necessary to take the teaching process and teaching achievements of English teachers as the basis for the output evaluation of the model and establish teaching quality evaluation indicators according to the specific output values. Teachers' resources, teaching curriculum, teaching environment, and teaching quality control are taken as the basis of specific index evaluation. The final college English teaching quality evaluation index system is shown in Figure 7.

Convolution neural network is composed of a group (multigroup) of convolution layers and aggregation layers. Different quantity of convolution units exists in the convolution layer. The aggregation layer ensures that the input information has node characteristics, so that the teaching quality can be effectively identified by reducing the complexity of the aggregation layer and aggregating the output nodes of the convolution layer with a fixed window length. The output of most layers is the maximum value of the long inner node of the fixed window, and the data of all layers are worth evaluating the quality of college English teaching. The

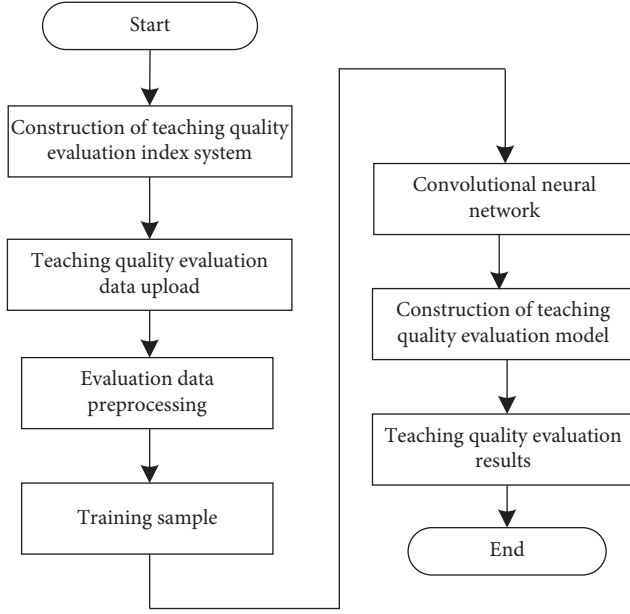


FIGURE 6: Implementation process of deep learning college English teaching quality evaluation model.

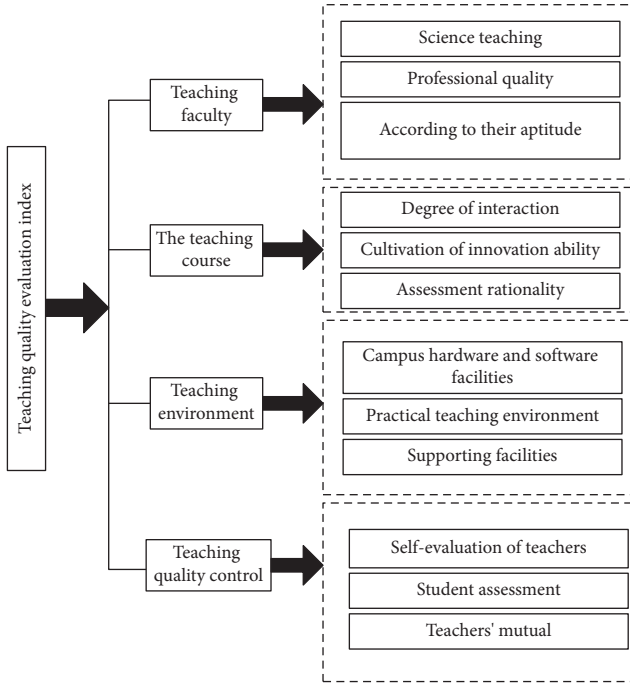


FIGURE 7: Evaluation index system of college English teaching quality.

aggregation layer and convolution layer structure of convolution neural network is shown in Figure 8.

The output calculation method of the convolver shown in Figure 8 is as follows:

$$D_{i,k} = \frac{\sum_{b=1}^{K-1} IN_{b,k} \cdot IN_{b+i}^T}{U}, \quad (4)$$

where  $IN_{b+i}^T$  and  $IN_{b,k}$ , respectively, represent the weight parameters of the  $i$ th input eigenvector and the  $k$ th

convolver;  $K$  and  $U$  represent the width and network offset of the convolver, respectively; the  $k$ th convolver and the  $i$ th group are weighted average; the sigmoid function is selected as the function; and the nonlinear function is used to calculate the output node value of the convolution layer.

After the model convolution is completed, the maximum value of the convolution result is taken as the aggregation output, and the maximum value in  $S1$  and  $S2$  is taken as  $S'$  output. With the gradual aggregation, the output nodes of the convolution neural network model are gradually reduced, and extracting network nodes with teaching features can improve the node aggregation output capability of convolutional neural networks, making it more accurate to identify teaching features. Based on the English teaching quality evaluation samples, the test samples are input into the English teaching quality evaluation model to obtain the teaching quality results.

### 3. Experimental Design and Result Analysis

**3.1. Parameter Setting.** First of all, set parameters for the experiment, from English network education training students randomly selected 1000 students to participate in the experiment. There were 400 men, 400 women, and 200 tutors. The frequency of video teaching is set at 50, 100, 200, and 300 times per month for teachers and students; 100, 300, 500, and 700 students; and 100, 200, 200, and 200 teachers. The specific settings are shown in Table 1.

**3.2. Experimental Data Acquisition.** This paper collects the data of English online network assessment module, which includes forum, course, homework, resource, user message, and chat room. Select a semester of online video teaching teachers and students from the forum to participate in the discussion, the completion of student work, resource browsing times, and online video exchange between teachers and students began to collect experimental data.

Take vertical intersection algorithm:

$$\begin{cases} A(s) = A(s-1) + A(s), \\ A(s') = PA_1(s') + PA_2(s') + PA_3(s'). \end{cases} \quad (5)$$

In the formula,  $W$  represents the extracted student achievement data;  $e$  represents the correction coefficient of the data,  $w$  represents the azimuth parameter of the data;  $N$  represents the difference parameter of student achievement;  $s$  represents the data of online evaluation results; and  $s'$  represents the ideal parameter of online evaluation data.

**3.3. Analysis of Experimental Results.** Using the teaching evaluation system based on data mining proposed in reference [3] and the teaching evaluation system based on CIPP proposed in reference [4] as the control experimental group, the experimental results are compared with the experimental results of the designed system. First, the information query response efficiency of different systems is counted. The efficiency of information query response is reflected by the response time of query process. The shorter the response

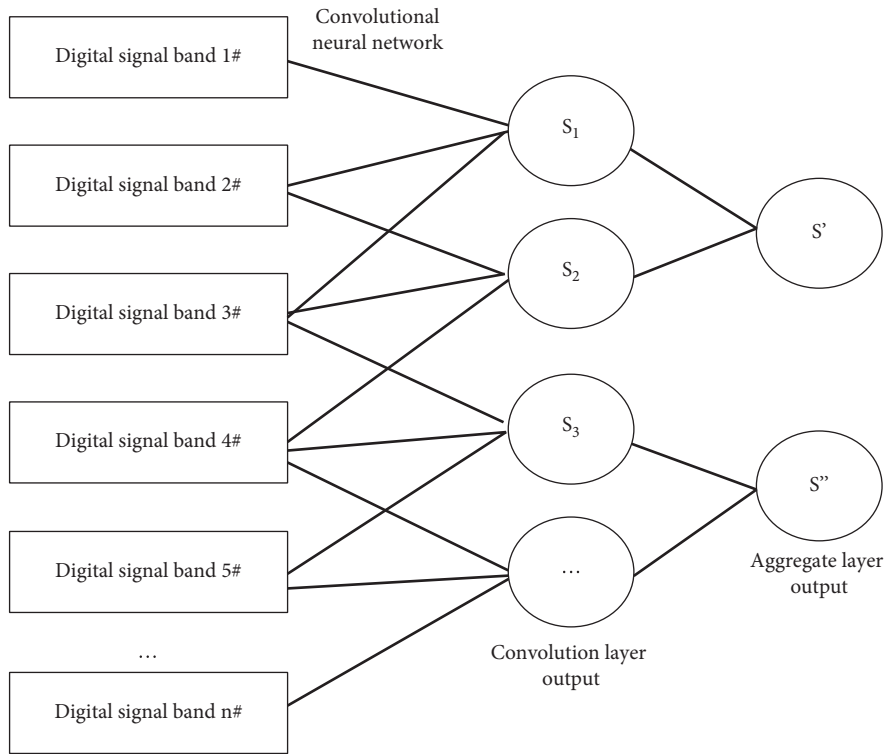


FIGURE 8: Structure of aggregation layer and convolution layer of convolutional neural network.

TABLE 1: Online teaching evaluation parameter setting.

Experiment	Video frequency	Number of teachers	Number of students attending class	Comparison of video frequency between teachers and students
Object	50	100	100	1 : 1
Experiment	100	200	300	2 : 3
Data	200	200	500	2 : 5
Experiment	300	200	700	2 : 7

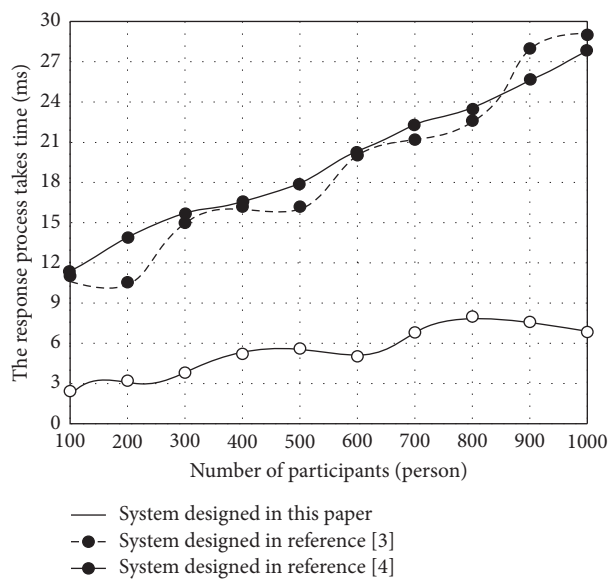


FIGURE 9: Comparison of information query response time of different systems.



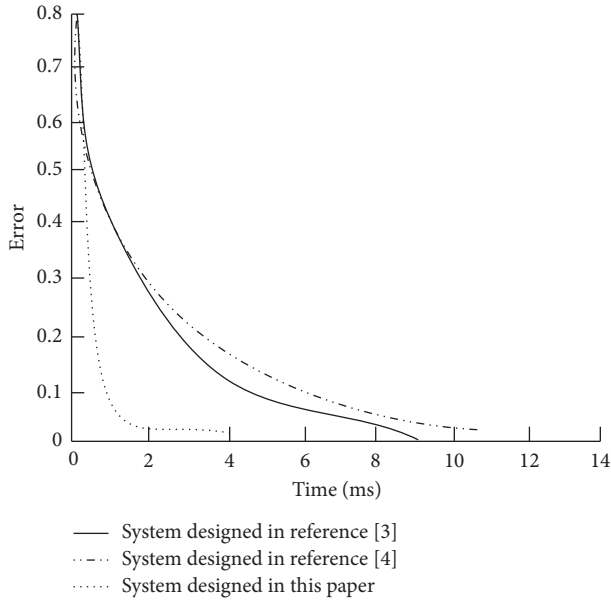


FIGURE 10: Convergence curve of interactive learning information scheduling of English courses in network environment.

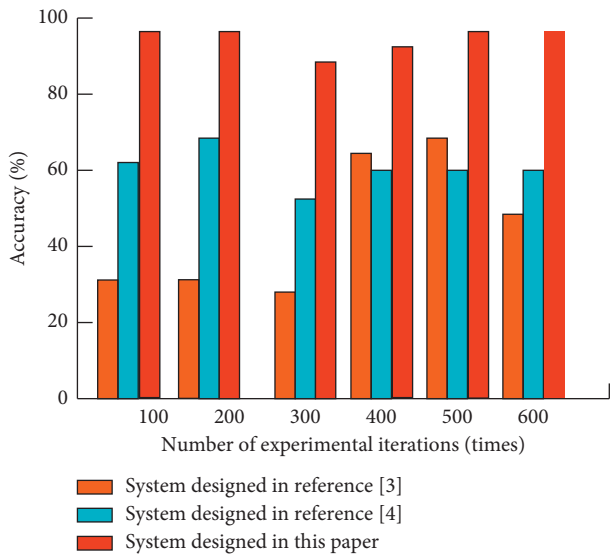


FIGURE 11: Evaluation accuracy test of oral English teaching.

time of query process, the higher the efficiency of the system. The comparison results are shown in Figure 9.

As can be seen from Figure 9, the more people participate in the evaluation, the longer the system takes to complete the information query. The information query response time of the system in this paper is always less than 9 ms. The information query response time of the teaching evaluation system based on data mining proposed in reference [3] is between 9 ms and 30 ms. The information query response time of the teaching evaluation system based on CIPP proposed in reference [4] is between 11 ms and 30 ms earlier. Through comparison, the College English teaching evaluation system based on mobile terminal designed in this paper can quickly complete the query of performance

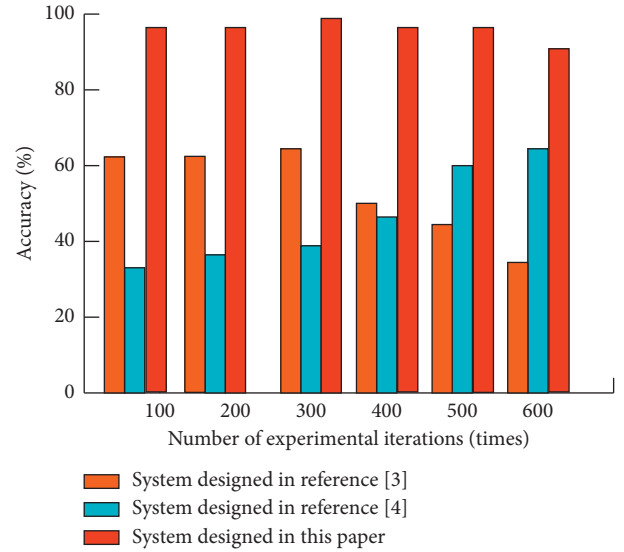


FIGURE 12: Evaluation accuracy test of English writing teaching.

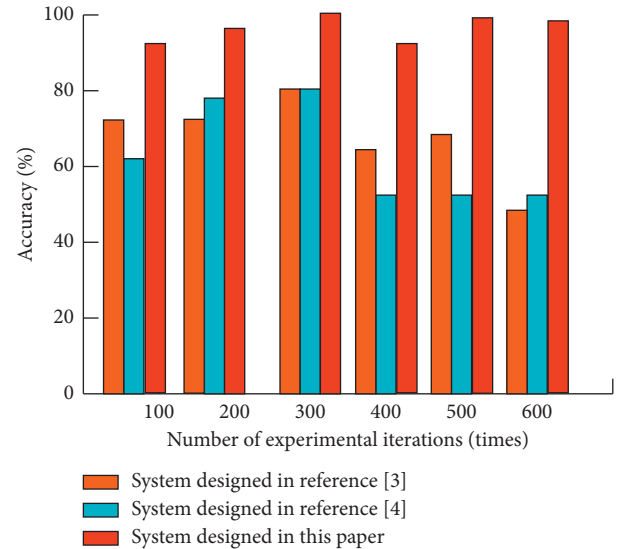


FIGURE 13: Evaluation accuracy test of English article reading teaching.

results, which shows that the system has high information query response efficiency.

The convergence curve results of English course interactive learning information sharing are shown in Figure 10.

According to Figure 10, when the initial convergence error is the same, the system in this paper is completed at 4 ms in order to reduce the convergence error to the bare minimum. According to reference, [3] the convergence error of the teaching evaluation system based on data mining proposed in [3] is the smallest at 9 ms, and according to reference [4], the convergence error of the teaching evaluation system based on CIPP proposed in [4] is the second smallest at 10.5 ms. The above experimental results demonstrate that the system method described in this paper



achieves good convergence in the information scheduling of English course interactive learning in a network environment when used in a network environment.

Comparing the accuracy of teaching evaluation results obtained by the system designed in this paper with those obtained by the teaching evaluation system based on data mining proposed in the literature [3] and the accuracy of teaching evaluation results obtained by the teaching evaluation system based on CIPP proposed in the literature [4], the ability of English speaking, English reading, and English writing is examined. The results of the comparison are depicted in Figure 11 through 13. Evaluation accuracy test of English writing teaching is shown in Figure 12.

According to Figures 11 and 13, the teaching evaluation accuracy of oral English, English writing, and English article reading of the system designed in this paper is high, and the system has ideal stability, as illustrated in the following figures. During the course of 600 experimental iterations, the accuracy of the evaluation was greater than 90 percent.

#### 4. Conclusion

A mobile terminal-based English teaching evaluation system is designed to allow for wireless data input and retrieval in the English teaching evaluation system. The overall design framework and development environment for the mobile terminal system are designed in conjunction with the B/S mode. The B/S model is used to construct the framework for evaluating the English teaching quality, and content analysis methods for evaluating the teaching quality, such as the user management unit and online evaluation unit, are constructed in order to ascertain the teaching quality of teachers. By mining data from English teaching resources, assessing students' progress, and analyzing the results of teaching quality analysis using a convolutional neural network model. The experimental results indicate that the system's response time for the English teaching quality evaluation data query is a mere 9 milliseconds, that the convergence error is kept to a minimum of 4 milliseconds, and that the evaluation accuracy of oral English, English writing, and English reading is high, always exceeding 90%. The experimental data above demonstrate that the system's design has an optimal application effect.

#### Data Availability

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

#### Conflicts of Interest

The author declares that he has no conflicts of interest.

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