Research Article

Evaluation System of Mobile English Learning Platform by Using Deep Learning Algorithm

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At present, China’s economic development continues to progress and foreign exchanges are also increasingly frequent. Learning to master the world’s universal pronunciation, English, has become a more important link. However, people’s living habits make it difficult to carry heavy desktop devices for a long time, so mobile English learning platform meets the development needs of people’s English teaching. Based on the existing English mobile learning platform, this paper puts forward the concept of integrating artificial intelligence and deep learning technology into it. Through deep learning, the learning status and learning situation of students in the process of English learning are extracted, so as to analyze the needs and learning interests of each student in English learning and then push corresponding English materials to each student, which improves the efficiency of English learning. In addition, deep learning can also model the data of students’ behaviors and build a language vector feature extraction mechanism and translation quality evaluation model, so as to carry out certain intelligent auxiliary correction and correction on students’ English grammatical expressions and spoken English. The research in this paper has achieved good results through practice. The practice results show that the integration of deep learning into the existing mobile English teaching platform can optimize the functions of the existing platform, provide more ideas for the development of online English learning, and has good theoretical and practical value.

1. Introduction

The term “deep learning” comes from the machine learning industry, which means a form of neural network that builds and simulates the human brain for analysis and interpretation, which is called deep learning. This deep learning network is extremely prominent in some complex problems. In the final analysis, it can strongly simulate the neural sensor system in the human brain for data analysis. This way of deep learning algorithm has been tested in many industries. In particular, the development and technological progress of image computer industry and computer industry promote the innovation of deep learning algorithm at the same time, and the complexity of which is no longer a problem. Therefore, the research and application of deep learning algorithm in the study of English learning methods can also greatly improve the data and information processing ability of English, improve the information processing efficiency of learners, and improve the overall user experience of learners. In English learning, many people will use repeaters, MP3, MP4, and other players, as well as mobile phone software, to achieve the purpose of learning English at any time, but most of the facilities cannot fully achieve the purpose of learning. They can closely realize the functions of search and follow-up, and there is no way to intuitively give English learners some guidance and advice, as well as follow-up learning and other ways. Moreover, due to the limitations of technical conditions, many network systems focus on the spelling of words and the English of grammar. Only one or two learning indicators are tested, which is not perfect in function, making English learners unable to intuitively feel the progress of learning. However, due to the differences in English learners’ English level, it is difficult to correct themselves and correct them in time.
through the errors prompted on the client. On the other hand, the final test of English is also subjective, and manual scoring is dominant for pronunciation standards and grammatical errors. In terms of manual scoring, because experts have different levels and experiences, the same expert may give multiple scores, so there are also many deviations. Experts like this also spend a lot of human and material resources, so it is not suitable for English learners.

In order to avoid the above shortcomings, we apply deep learning to the construction of English learning methods and establish a learning method model based on deep learning algorithm, so as to improve the accuracy and speed of English learners’ learning English [1]. In addition, the traditional English learning methods have been improved, and a reasonable and objective English learning method model has been established considering the pronunciation, grammar, composition, and other parameters involved in learning English [2, 3]. This research will obtain a number of original research results, such as English learning methods. In the future, the research results can be used in many applications, such as human-computer interactive English learning training and evaluation [4]. Giving corresponding guidance methods for error information in English teaching mode can effectively enable learners to learn English well. In addition, the research results can effectively solve the problems formed in teaching and improve the current situation of learners’ learning English [5].

2. Related Work

Aiming at the problem that some English songs may have melody changes, leading to difficulty in recognition, the literature designed melody factors, constructed prosody model, and added melody recognition to the original monotonic one-tone and three-tone models, thus improving the accuracy of speech recognition [6, 7]. In view of the current situation that speech quality is difficult to be guaranteed in noisy environments, the literature puts forward the improvement of target speech acoustic model confusion [8]. In view of the details of phoneme pronunciation, the literature introduced the GMM model to model and sort out the feature distribution of sonic speed in a more detailed way, so as to solve the details in English pronunciation recognition more pertinently and improve the efficiency and accuracy of English pronunciation recognition [9]. In the literature, a new computational strategy is introduced in the grading of English speech, so as to further narrow the gap between the grading proposed by the machine-assisted correction and that proposed by the teacher’s manual modification, so that the machine can learn the grading rules more accurately and improve the performance of the computer-aided learning system [10]. In terms of the design of English mobile teaching platform, the literature has proposed that the current English mobile teaching platform is more in the form of database [11]. The course is sorted out in advance by teachers and platform staff, and the materials are collected in the online platform for students to use [12]. According to the literature, the current mobile English teaching platform is the use of social software in the field of learning, and learning is essentially completed through interpersonal communication [13]. The literature summarizes the previous research experiences and puts forward that the current mobile English teaching platform is actually a new application of the traditional social network carried by the Internet in the field of education [14]. The existence of the Internet provides teachers and students with more technical support, which is essentially a new media [15]. According to the literature, under the current development status of artificial intelligence, traditional social networks have made new progress, and artificial intelligence technology should also be introduced into the design of English mobile teaching platform [16]. However, there is still a lack of application of relevant technologies in this direction, so it is necessary to learn and master relevant artificial intelligence technologies as much as possible and optimize the existing mobile English teaching platform through machine learning [17, 18].

3. Design of Mobile English Learning Platform


At present, the system architecture of mobile English learning platform is still a common three-tier application service structure. The overall block diagram of the system structure is shown in Figure 1. The intelligent control layer includes commonly used mobile phones or laptops. The mobile smart client controls the service management layer through the built-in fixed access system and application server and manages the entire system server by logging in to the browser.

The focus of this system research is to realize the functions of the whole mobile intelligent client. After the installation of the mobile intelligent device system, the client preinstalls the logic functions of the whole client business. This application is only one end of the server. The focus of the system is on the request function of the mobile intelligent client to send business logic. The design requirements of the whole server system should be combined with the interaction of the data server to interact and transfer data between the system client and the data server. All data should be processed and transferred by the unified server, that is, after receiving the data request from the client, the server should transmit and send the data of the application operation. The data information processed in the database should also be transmitted to the server terminal for system processing and unified transmission. Finally, the system should be screened and displayed in the mobile intelligent data terminal.

3.2. System Function Analysis.

The mobile client of this system is simply like a smart phone or tablet computer using 5G mobile network. This kind of smart device has the characteristics of convenient carrying and light use. Through the whole mobile intelligent client platform, the system client can use its spare time every day to learn interesting knowledge. If the English learning materials and services provided by the system are not satisfied, you can go to the
customer service terminal for demand analysis and push more qualified learning materials.

In terms of technology, under the current network technology environment in China, 5G network has been widely spread to medium and large cities and regions. Moreover, 3G network technology has a fast Internet speed, which is unmatched by ordinary broadband networks. Therefore, it is convenient and effective to use 5G network to transmit data. This system also has additional online video on demand function, which is not a small breakthrough for English learning software in 4G environment. This is because the users of English learning system have greatly improved the efficiency of English learning. Video media can be seen in the whole English learning system, which makes the whole English learning more intuitive. The addition of audition function is more conducive to the learning and practice of English knowledge.

However, in terms of other business functions and service requirements, this system also covers the functional requirements of most users for learning English, so that the English learning system can more meet the needs of potential customers. After analyzing and comparing many users of professional English learning, several aspects are added to the English learning system.

3.2.1. Online Simulated English Test Function. Under the English level test function, the client of this English learning system can screen several popular English level tests at home and abroad and simulate the learning process under the test environment. The popular English tests at home and abroad include CET-4 and CET-6, public English level test, Cambridge Business English test, IELTS, and TOEFL. The background of the English system will push the real questions over the years and conduct online simulation tests according to the test content selected by the candidate, judge and analyze the test results, give standard answers, and uniformly explain the wrong answers. Of course, this system design only provides the option of objective questions, which is not open for subjective classes such as composition questions.

3.2.2. English Short Plays, Movies, and Other Videos on Demand Functions. For potential client users who need to strengthen the practice of listening and speaking, this system also provides English film series for oral material practice. In the video content push, the system pushes different materials for users at different levels, including educational films, cartoons, English films, and other materials with slow pronunciation standard sentences, which lays a solid foundation for practitioners in English listening and speaking. For some basic system clients, it provides some high-end English film classics to learn.
3.2.3. Life and Work Situation Simulation Dialog Function. For some English system learners who need to go abroad, it will provide some daily functional scene simulation environments, so that learners have an immersive sense of dialog and always cultivate the ability of emergency dialog. These scenes usually include restaurants, hotels, banks, stations, supermarkets, and airports and even provide common sentences such as alarm, inquiry, and thank you to learn and use.

3.2.4. Online Translation Function. This function is aimed at some English fresh users to translate and carry out certain online translation according to the provided words and sentences. This translation function is not only implemented in the third-party translation function but also to facilitate the use of English client users to solve the troubles of jump software.

3.3. Mobile Terminal Architecture Protocol Design. Mobile end architecture protocol is an open chat technology, which can be used to customize any chat software. Although the agreement can provide many customized functions, many expanded functions need users to realize and experience by themselves. Among them, the basic function is to realize single person or multiperson chat, as well as personal data display function. This paper starts from the specific content of the mobile terminal architecture protocol and describes its functions, internal implementation principles, and the way of network data transmission.

3.3.1. Protocol Architecture. The architecture used by the mobile end architecture protocol is based on the form of client server cluster, which has multiple forms of interaction with each other. The following figure shows a simple system architecture. The corresponding background is the open-source server that runs the whole server and completes the writing. It dominates a huge amount of information and has powerful functions. The amount of background data contained in this system is huge, so the amount of relevant client software is also increasing. If these data can be subject to the mobile end architecture protocol, the responsibility separation mode between the client and the server can be realized. In this way, system development researchers do not need to install complex processing logic, but only need to pay attention to how to write the operating system of the client to make it run at high speed. Openfire server needs very professional logic processing ability and receives and processes data requests transmitted from different clients at the same time. Many clients will customize different personality modules according to their own service providers. Therefore, the mobile client protocol has strong scalability requirements and is deeply loved by customers, as shown in Figure 2.

3.3.2. Network Communication Mode. On the basis of mobile Internet communication, if one party wants to receive the information of the other party, it will generate a specific address as its identity mark. The selfsymbol in the mobile architecture protocol is called JID, which is a kind of running code. JID is a kind of entity and unique sign, just
like everyone’s ID number is different. JID format code and e-mail address format are very similar. Like e-mail address example@jabber.org, similarly, the example in this refers to the user’s name, and the address after the @ symbol is the server address information. In the common mobile end architecture protocol, the transmission format between the two mainly uses the idea of layering to split information. It is divided into three information elements, and the content labeled by each element is a file message, including the sender’s information, the discoverer’s Avatar, and the sending content. The presence tab is mainly used to obtain whether the user is online, as well as the list of relevant friends and other information. After we get the network communication and analyze it, we can get the useful information we want.

3.4. Mobile Software Development Environment. Before the preliminary design, we must first build a stable development environment. From the perspective of the overall system architecture, the system should be divided into two modules: server and mobile client. The development and configuration environment is usually background management server: 64 bit cent OS 7.0; Openfire server: Apache 2.0; background database: my SQL 5.5 is configured on the background management server; client development environment: Mac OS X 10.10 Yosemite + I Phone7 mobile phone.

At this stage, the background service manager uses Alibaba cloud virtual server to transfer the corresponding Apache server and my SQL database to the cloud server. The corresponding website of the cloud server is www.bigtree.com. Download the latest Openfire server and configure it in the background. Local services can be provided in the whole test phase. On this basis, database information needs to be selected and connected with my SQL database.

The program development voice form of the mobile client is operated on the Apple system, but because the Apple system and Android system are not interconnected, the commercial operating system developed by Apple is adopted instead of Android system. IOS software development kit, known as iPhone SDK, is a software development kit specially established and developed by Apple to develop IOS applications. The first development was in early 2008. After its release, the software development package can only host IOS or Mac OS operating systems, and other operating systems cannot host and run. This system is not open to the public and must be operated on an Apple system. When developers develop software, they can only download and use it for other users on the application manager where they are located. Developers need to pay a certain fee to release the application. Therefore, developers can freely customize their own system price in the application software. The tool for developing IOS programs uses Xcode, which is the only software for developing IOS programs. The software can not only develop IOS applications but also develop computer applications. Apple generally releases two versions at the same time when it releases the system, one is a stable version that has been tested many times, and the other is a beta version for developers. The advantage of the two versions is to let everyone debug the vulnerabilities under this version and increase the stability of the system.

4. Application of Deep Learning Algorithm in the System

4.1. Foundation of Deep Learning Algorithm. A deep learning adjustment algorithm means that the learning adjustment parameters are $\theta = \{w, a, b\}$, assuming a given training sample, even if the distribution probability of the corresponding deep learning calculation algorithm matches it under this condition. The sample set satisfying the distribution conditions given: $S = (v_{(1)}, v_{(2)}, \ldots, v_{(N)})$, which maximizes the goal of training the deep learning algorithm, as shown in formula (1):

$$L_\theta = \prod_{i=1}^{N} P(v_i). \tag{1}$$

Due to the relatively cumbersome processing of concatenation in the formula, the strict monotonicity of function $L_{\theta}$ can be known, maximizing $L_\theta$ is equivalent to maximizing $LN_{\theta}$.

4.2. English Learning Level Evaluation Algorithm. English learning level usually tests the speed of oral pronunciation, which is reflected in the speed of speaking intonation when learning English. It can also be calculated by calculating the change of syllable length in unit time by computer, or by the length of pause between two English words. Due to the differences of individual speaking, different people have certain differences in the pronunciation of different sentences. Moreover, the different emotional states of speaking also affect the effect of sentences. For example, in the state of anger and happiness, the sentences expressed are slightly gentle, while in the state of sadness, the sentences are slightly slow.

This paper studies the change of English sentence length by calculating the duration ratio $\varphi$, as shown in formula (2):

$$\varphi = \frac{Len_{std}}{Len_{test}}. \tag{2}$$

Among them, $Len_{std}$ is the standardized parameter duration and $Len_{test}$ is the duration of the test statement. For further setting and comparison of data, see Figure 3.

The pronunciation speed displayed by sentences can be followed by rules and cycles. For speaking rhythm, it can be divided into stress type, incomplete stress type, and stress type. In English, learning, reading, and talking, rhythm combination patterns in different states alternate, and language rhythm has different itineraries. Therefore, the English Sentence Rhythm evaluation mechanism is shown in Figure 4, and the specific steps are as follows:
4.2.1. Extract English Short-Term Energy Values to Form an English Intensity Curve. The poisoned scale characteristics in the sentence reflect the change of energy intensity. The greater the change of English intensity of stressed sections, the definition of short-term energy of English signal \( s(n) \) formed in this state is shown in formula (3):

\[
E_n = \sum_{m=\infty}^{\infty} [s(n)\omega(n-m)]^2.
\]

For short English sentences, the corresponding calculation mode can be formed. Each frame on the X-axis matches the frame between \( y_{\text{min}}, y_{\text{max}} \) on the Y-axis. The calculation of \( y_{\text{min}} \) and \( y_{\text{max}} \) is as follows:

\[
y_{\text{min}} = \begin{cases} 
\frac{1}{2}x, & x \in [0, X_b], \\
2x + (M - 2N), & x \in [X_b, N], 
\end{cases}
\]

\[
y_{\text{max}} = \begin{cases} 
2x, & x \in [0, X_a], \\
\frac{1}{2}x + \left( M - \frac{1}{2}N \right), & x \in [X_a, N], 
\end{cases}
\]

where \( D \) and \( d \) represent cumulative distance and frame matching distance, respectively. This paper uses the double threshold comparison method to detect the accent endpoint and sets the threshold after data comparison, such as formulas (5) and (6):

\[
T_u = \frac{(\max(\text{sig.in}) + \min(\text{sig.in}))}{2.5},
\]

\[
T_j = \frac{(\max(\text{sig.in}) + \min(\text{sig.in}))}{10}.
\]

According to the time length analysis of English learning, the improved dPVI parameter calculation formula is adopted to compare the length of fragments of complete English sentences and test sentences, and the converted parameters are processed systematically, as shown in formula (7):

\[
dPVI = 100 \times \frac{\left( \sum_{k=1}^{n-1} |d_{1k} - d_{2k}| + |d_{1k} - d_{2k}| \right)}{\text{Len}}.
\]

For the correlation function between the correlation function algorithms, calculate the similarity between the sound frame \( s(i), \{i = 0, 1, 2, \ldots, n - 1\} \) and itself, as shown in formula (9):

\[
\text{acf}(\tau) = \sum_{i=0}^{n-1-\tau} s(i)s(i + \tau).
\]

4.3. English Writing Level Evaluation Algorithm. The level of English writing under this system is very different from the situation of English texts. It is the main purpose of the establishment of English learning system. It is to process the text data transmitted from the front end, remove the classification under complex English texts, and select English words and sentences with low correlation. The corresponding English words and sentences are transformed into vector data in the computer processing mode, so that the classification of the English original text is one-to-one corresponding.

The constructed co-occurrence matrix is expressed as equations (10) to (11):
\[ M_{te\_{human}} = 1, \]
\[ M_{te\_{instinct}} = 1, \]
\[ M_{to\_{get}} = 1, \]
\[ M_{to\_{promoted}} = 1. \]  
(9)

The formula of GloVe model is as follows (10):
\[ J = \sum_{i,j} f(X_{i,j})(v_i^Tv_j + b_i + b_j - \log(X_{i,j}))^2. \]  
(10)

\( v_i \) and \( v_j \) represent the word vector of words \( i \) and \( j \), respectively, \( b_i \) and \( b_j \) represent deviation, \( f \) represents weight, and the number of words is represented by \( N \). It can be seen that this model does not involve any derivation and exercise in the form of neural network.
\[ M_i = \sum_{j=1}^{N} M_{i,j}. \]  
(11)

The frequency of word \( i \) and other words in the sentence can be expressed as formula (12):
\[ r_{i,j,a} = \frac{P_{i,a}}{P_{j,a}}. \]  
(12)

Therefore, the generated vector words have to go through the derivation exercise of some function. The text related information contained in this word vector is expressed as formula (13):
\[ f(v_i, v_j, v_a) = r_{i,j,a} = \frac{P_{i,a}}{P_{j,a}}. \]  
(13)

The three variables are infinitely close. The variance between the two can be used as a function.
\[ J = \sum_{i,j,a} \left( \frac{P_{i,a}}{P_{j,a}} - f(v_i, v_j, v_a) \right). \]  
(14)

Considering the linear relationship between the two words and the constancy of the result, let
\[ f(v_i, v_j, v_a) = \exp\left(v_i - v_j^Tv_a\right), \]
\[ \frac{P_{i,k}}{P_{j,k}} = \frac{\exp(v_i^Tv_a)}{\exp(v_j^Tv_a)} \]
(15)
\[ P_{i,k} = \exp\left(v_i^Tv_a\right), \]

The brought in function can be expressed as follows:
\[ J = \sum_{i,j} \left( \log(P_{i,j}) - v_i^Tv_j \right)^2. \]  
(16)

The expanded formula is as follows:
\[ \log(X_{i,j}) - \log(X_i) = v_i^Tv_j. \]  
(17)

Let \( b_i \) and \( b_j \) be deviation values, then \( J \) satisfies the following formula:
\[ J = \sum_{i,j} f(X_{i,j})(v_i^Tv_j + b_i + b_j - \log(X_{i,j}))^2. \]  
(18)

It can be seen that GloVe model can well show the relevance between the two words, and its actual expression effect is also higher than other models. The quantitative expression of English text words and sentences is transformed into text sequences, and hash search is carried out.

5. Application of Mobile English Learning Platform

5.1. Platform Test Results. For the delay effect of the English learning platform test system, when English learners enter the interface, click the function key to request to send data, and the time interval between data sending and receiving can be calculated under the test module of mobile data terminal. By testing the increase of users one by one, the curve formed by the delay time under multiple modules is shown in Figure 5.

The results of the reaction on the graph show that the functions realized by the system affect the effect of delay. According to the data analysis, the unit of delay is seconds. Therefore, there is almost no so-called lag and hysteresis. With the increasing number of users, the response time did not increase significantly and gradually became a flat trend. The test results show the stability of the mobile platform system and achieve the effect of user satisfaction.

5.2. Application Effect Analysis. In terms of specific experimental classification, in addition to the distinction between single group and multiple groups of experimental objects, there are also differences between pretest and post-test. In order to further study the application effect of this system, the paper chooses the way of controlled experiment. The experimental group adopted the online mobile English teaching platform based on deep learning proposed in this paper, while the control group adopted the traditional online English learning platform. After one semester of online course learning, the final scores of the two groups of students were compared, as shown in Table 1.

In this group of satisfaction tests, a data analysis form of four options is designed to test the difference between English and learners’ overall satisfaction with setting up an English learning platform. The satisfaction test results are shown in Table 2 below:

The test results show that in the comparison of pretest and post-test, English learners analyze the difference data from the mean value and standardization, and the data results formed by the post-test are more prominent than the pretest. For the establishment effect of the teaching mode of mobile English learning platform, the degree of satisfaction formed is more distinct. This means that in this
environment, English learners from the beginning of the unfamiliar attitude, after learning for a period of time into love and identity. The changes in this period are significant in many aspects, such as cognition, emotion, ability, and behavior effect. Among them, there is no obvious change in the satisfaction of English learning process. The main reason is the dependence on traditional learning methods. Individual English learners believe that although the establishment effect of mobile English learning platform is very obvious, due to individual differences and differences in learning concepts, it is difficult to achieve long-term persistence learning effect, and there is a certain sense of laziness. From the perspective of this theoretical concept, we have more realized the responsibilities and obligations of educators. As long as English learners are educated in ideas and theoretical concepts, they should also form quality-oriented training in the face of many individualized student development. Only by constantly updating the educational concept and innovating the teaching mode we can change the current English teaching quality and make students develop in an all-round way.

6. Conclusion

The core of building mobile English learning platform is the research and evaluation technology of English learning system, and the technology of English learning system is the key. As learning English becomes more and more complex, English learners have a huge amount of data and information, and there are more characteristic parameters in the English learning industry. Therefore, the English learning system and evaluative calculation involved are also huge, which makes the processing of information under the English learning system have higher hardware requirements and algorithm requirements. Traditional English learning system algorithm and artificial algorithm have their own advantages and disadvantages and have different bottlenecks for their development, so it is difficult to judge their accuracy. In recent years, with the development and

<table>
<thead>
<tr>
<th>Table 1: Comparison of final grades between the experimental group and the control group.</th>
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<tbody>
<tr>
<td>Lowest score</td>
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<tr>
<td>Test group</td>
</tr>
<tr>
<td>Control group</td>
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<table>
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<tr>
<th>Table 2: Overall satisfaction test of mobile English learning platform.</th>
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<tbody>
<tr>
<td>Satisfaction</td>
</tr>
<tr>
<td>---------------------------------------------------------------</td>
</tr>
<tr>
<td>I Like the teaching mode of mobile English learning platform</td>
</tr>
<tr>
<td>Satisfied with the mobile English learning platform process</td>
</tr>
<tr>
<td>Like to incorporate a variety of new media technologies into learning</td>
</tr>
<tr>
<td>Very satisfied with the effect of the mobile English learning platform</td>
</tr>
</tbody>
</table>

Figure 5: Comparison of response delay.
accumulation of deep learning algorithm definition and deep learning achievements, the technology of establishing English learning system has developed rapidly. Deep learning algorithm is a nonlinear network structure form, characterized by the distribution of information and data processing, and rationalized the ability to show multiple features sorted out by the sample set. It is more excellent in learning algorithms that simulate human brain and has played a prominent role in the development of mobile English learning platform.

Data Availability

The 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.

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