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Research Article

Approaches to the Development of Language Intelligence in Multimedia English Teaching from the Perspective of Game Theory

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At present, the majority of English language learners use computers as an aid to support their learning. However, the existing software is relatively homogeneous, which can only correct the pronunciation errors of the English language. Due to the massive number of problems in the software itself, it is difficult for English language learners to correct the errors that occur in their pronunciation properly. In this study, a scoring mechanism is established from the game theory perspective of language intelligent development in combination with multimedia-assisted teaching from three perspectives, that is, acoustics, rhythm, and sense of speech. The output of deep learning is simulated by using network parameters based on language intelligent development to assess the language. Meanwhile, the teaching data and materials for the English language are uploaded and answered online in real time. In this way, students can have access to the course content shared by the teacher, which has a certain auxiliary effect on the English language learning of the students. With the aid of multimedia technology, an excellent English teaching model can be used to enhance the English language learning ability of students effectively and improve their interest and initiative in English learning with the English learning of students as the main body. It can be seen from the results of the simulation that students' learning efficiency in exploring English language independent learning can be improved effectively mainly by making use of the reference database and aligning it with expert knowledge for error identification.

1. Introduction

In traditional English learning, more attention has been paid to the understanding of reading and writing, while less attention is paid to the association of the English language. As a result, the learners often can write but not communicate smoothly, and there are a lot of obstacles to communication, which cannot meet the practical demand. The progress of computer technology allows a lot of resources to be shared via the network, which also makes it highly convenient for English learning. By using the language intelligent development technology, the resources of standard pronunciation can be shared, and users can choose the corresponding resources to compare oral language pronunciation according to their requirements. However, it should be noted that it is highly crucial and complicated to identify how to carry out language intelligent development [1–4]. As the accent of various people are different and may be mixed with the corresponding accent, it leads to the fact that with regard to the same sentence or word, various people may pronounce them in a different accent; the accurate and effective identification of English accent is relatively complicated because it involves the identification of not only words but sentences. Industry experts have also tried to carry out assessment of the English accent and pronunciation quality and perform the detection of the language intelligent development signals and the corresponding feature extraction for the English language. Through the intelligent processing of the signals, the English language pronunciation signals are analyzed so that the assessment of English language quality can be further conducted. However, there are still some limitations when it comes to the assessment of spoken

language because it is impossible to guarantee the performance in feature extraction and detection. Correct pronunciation ensures unhindered communication, while incorrect pronunciation or the use of wrong words can reduce the efficiency of communication. Hence, it is necessary to correct the English language pronunciation effectively based on the corresponding system. English language education is conducted through teacher-student exchange, a system with prominent social characteristics. The system of assessment indicators in combination with the teaching model makes up the education weighed by assessment indicators for the English language. A mutual agreement should be reached prior to teaching, and satisfaction after teaching is also required. With the great improvement in mobile terminal performance worldwide, relentless efforts have been made by different operators in the development of built-in software for cell phones. In addition, various language recognition types of software have gradually become more and more extensively used as well. However, general cell phone language assessment is a function of the cell phone that provides users with human interaction [5, 6]. The assessment of multimedia-assisted English teaching allows learners to fully tap their potential by using the learning method. In addition, it helps learners master the knowledge of English effectively and express their thoughts smoothly. As big data technology continues to develop, multimedia-assisted English teaching assessment has also become a process of learning through learners' preferences. This helps educators to have a full picture of students' self-expression capabilities. In this way, they can urge English learners to carry out research studies on learning, and the subjects are changed from a macroscopic group to a microscopic individual, which is also conducive for English educators to provide individualized teaching guidance in accordance with the practical situations of the students. Meanwhile, multimedia-assisted teaching is also an effective way to implement English teaching and learning. With the characteristics of individual learners as the basis, the suitability of multimedia-assisted English teaching is explored. Since learners are different, it is necessary to carry out multimedia-assisted English teaching based on language intelligence development in accordance with different learning situations. As English learners have a higher and higher requirement for independent learning and more and more individualized learning methods have been developed, teachers can develop scientific learning programs for the corresponding tasks to facilitate English learners to achieve their individualized learning goals. Hence, from the perspective of the game theory, multimedia-assisted English teaching based on language intelligent development allows teachers to provide customized teaching to meet the demands of the learners effectively and address the issue of individualized learning [7–9], plan the contents and assignments for English learners in accordance with the learners' own situations, and give feedback and appraisal in real time. The field of English knowledge is mainly a collection of knowledge units with the summary of all experiences and theoretical methods in English learning. Special design can be made by computer according to the particular knowledge type [10, 11]. The continuous progress in modern IT based on cloud computing, big data analytics, and hypermedia allows the provision of virtual teaching and convenient guidance to learners of the English language. Universal interconnectivity, intelligent application, massive data mining, user-friendly learning interface, and other IT services can not only provide a more engaging English teaching environment but also be a game changer for teaching English in the past. It can adjust the teacher-student relationship and apply English language learning to practical information technology, making it a major factor in the "structural reform" of English language education.

Although the English teaching resources online are abundant, there are still some defects and limitations. Hence, the game theory combined with the multimedia English education approach is introduced in this study. This English language intelligent development method has excellent performance and can play a positive role in helping students with their English learning. Attempts are made to carry out the development of language intelligence, with the purpose to explore the scientific nature and effectiveness of English teaching based on multimedia and to offer an immersive experience to the students when they learn English. The perspective of the game theory is introduced in this study to assess the subjective and objective factors by sorting out the main indicators for the assessment of English language pronunciation and establishing a scoring mechanism of the language intelligent development identification algorithm to facilitate the self-learning and self-correction of English language, improve the effectiveness and efficiency of English teaching, and make it more fun for the students to learn English.

2. Language Intelligent Development from the Perspective of Game Theory

The proper utilization from the perspective of the game theory in multimedia-assisted English teaching on the language intelligent development method requires the establishment of a self-learning model for the English language based on the actual demands of the learners [12, 13]. The ability of students to self-learn the English language is analyzed in detail from the perspective of game theory. A model for information flow is established using different equations with parameters for the ability constraints of the multimedia-assisted English teaching in the ranking capacity of the language intelligent development method.

$$x_n = x\left(t_0 + n\Delta t\right) = h\left[z\left(t_0 + n\Delta t\right)\right] + \omega_n, \tag{1}$$

where h(.) is the multivariate value function to analyze and assess the multimedia-assisted English teaching on the language intelligent development method in the classroom and ω_n is the assessment error measurement function. A scalar sampling sequence component set is constructed according to the information flow model and is established to analyze and assess multimedia-assisted English teaching using the language intelligent development method, laying a foundation for accurate data input in multimedia-

assisted English teaching based on the language intelligent development method in the lecture analysis. Multimedia-assisted English teaching based on language intelligent development is implemented from the perspective of the game theory to establish the objective control function for predictive estimation as shown in the following [14]:

$$\max_{x_{a,b,d,p}} \sum_{a\in A}\sum_{b\in B}\sum_{d\in D}\sum_{p\in P} x_{a,b,d,p}V_p,$$
$$s.t. \sum_{a\in A}\sum_{d\in D}\sum_{p\in P} x_{a,b,d,p}R_p^{bw} \le K_b^{bw}(S), \quad b \in B. \tag{2}$$

Hence, detailed analysis can be conducted in the learning environment by using the assessment indicator system for English teachers.

The multimedia-assisted English teaching system based on big data using the language intelligent development method is analyzed, and assessment is made from the perspective of the game theory, and the entropy feature extraction values for the information on the constraint characteristics of the English language classroom scheduling capacity can be obtained as follows:

$$P_{\text{loss}} = 1 - \frac{1-p_0}{\rho} = \frac{p_0+\rho-1}{\rho} = \sum_{n=1}^{N} p_{K,n}. \tag{3}$$

The vector d_i of perturbation characteristics is given for the instructional analysis and assessment.

In combination with the characteristics of linear correlation, classroom teaching of the English language can be assessed by clustering and consolidating indicator parameters, with the output fusion equation for the educational resources as follows:

$$P(w|x) = \frac{P(x|w)}{P(x)}. \tag{4}$$

With $(N(i)\text{mod}L) < m$ as quantitative recursive characteristics, $p(i) = \lfloor N(i)/L \rfloor$ as the probability density of teaching resource distribution in multimedia-assisted English teaching based on language intelligent development methods and assessment, big data flow X(i) can be classified as p(i) X_{ij} sub-matrix at $N_{ij} \times m$. Then, the corresponding teaching resource distribution plan can be prepared by clustering and consolidating indicator parameters. In this way, multimedia-assisted English teaching based on language intelligent development methods and assessment can be optimized.

With regard to data collection, the data in the network are first processed to eliminate redundant information; that is, data should be clustered and preprocessed before eliminating the corresponding redundant data, thus lowering the transmission cost and improving the transmission efficiency [15, 16]. The details are shown in Figure 1.

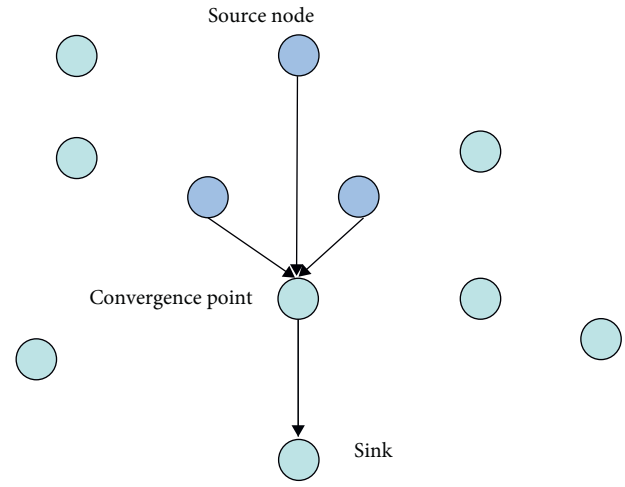

Figure 1: A schematic diagram of data aggregation.

English learning is not only about enhancing the basic knowledge of the English language learners in the field currently but also about improving the most fundamental multimedia-assisted English teaching characteristics for learners. For a better visual representation of multimedia-assisted English teaching effects, the learning contents are classified based on targeted learners using the learning model established. The cognitive level of each learner for multimedia-assisted English knowledge points is assessed. The learning method applicable for individuals is established by adjusting the difficulty coefficient of contents and order of English learning in real time. Currently, as multimedia-assisted intelligent English teaching continues to improve, the system database has higher and higher capacity, and data processing becomes more and more difficult as well. The learner mastery level of English knowledge can be accurately measured by the English learner model using system subject technology.

The English language intelligent development method based on multimedia from the perspective of game theory mainly refers to the design of the multimedia English language intelligent development method from the perspective of game theory and the full reflection of the algorithm in the process of code writing [17]. In the aspect of implementing the model, the teacher-student requirements can be met. From the perspective of game theory, the quantitative indicators of English language education can be resolved. In particular, it can address the issue with regard to how different educational effects on the part of teachers can be optimized based on the configuration of educational methods and educational contents. The algorithm for the students mainly addresses the effects of different learning conditions and assignment schedules, with the algorithm model for students as shown in Table 1.

The proposed algorithmic model mainly focuses on investigating the performance of the students in national College English Test level 4 and level 6 (CET-4/6). The input layer shows the time spent by students on learning based on the language intelligent development method; the hidden layer shows the contents of various learning

Table 1: The algorithm model for students.

Input layer	Hidden layer (conversion function $C_j\sigma_j$)				Output layer
	Field of reading	Range of vocabulary	Knowledge points	Grammar	
Language	Finance	Chapter	Subordinate clause	Article	Grades
Writing	Economy	Paragraph	Slang	Adverb	Grades
Listening	Technology	Sentence	Reading	Verb	Grades
Correction of errors (COE)	Politics	Phrase	Voice	Adjective	Grades
Reading	History	Word	Vocabulary	Noun	Grades
Translation	Communication technology	——	Tense	Pronoun	Grades

materials; the output layer presents optimized subject results of the total score in CET-4/6. Subsequently, the proportions of the time consumed are compared. To obtain a sound English proficiency learning rule, some universities in some provinces have accepted sophomore students and freshmen who have taken College English Test (CET) levels 4 and 6 to carry out data collection [18, 19]. Among them, more than 8,000 students have taken the test, and nearly 3600 of them have passed College English Test (CET) levels 4 and 6. Hence, the baseline model of students with good grades has largely reflected good habits in learning English (Table 2).

3. English Intelligent Development Method Based on Multimedia

English teaching based on multimedia and the dynamic input system facilitates the change in multimedia-assisted English teaching based on intelligent language development, and an external model of visible teaching is used for indirect measurement. The multimedia-assisted English teaching process in students is analyzed to assess the types and characteristics of teaching activities and obtain the indicator system to assess the English teaching platform. The English teaching based on multimedia for language intelligent development mainly includes the preparation for the English teaching platform, teaching in the classroom, and individual tutoring. The activities of student learning include students learning on the teaching platform by themselves and peer students helping each other. The teaching platform and the time consumption in the teaching process are used to measure the characteristics of multimedia-assisted English teaching activities, and students' enthusiasm and time spent on learning are used to explain their learning patterns. The teaching enthusiasm based on the English teaching platform is taken as an indicator to assess the effort in multimedia-assisted English teaching activities on the teaching platform, which are also active teaching activities by using the multimedia-assisted English teaching model [20]. Based on modern information, the dynamics of the assessment system are input into the higher teaching platform. As the two subjects of the teaching model, the teaching platform and students are taken as the basis for the assessment of the system based on the informatization of the relevant data. In previous English education, it was required that the teaching platform and the students should have been combined with the teaching model. In the teaching model based on the education system, teaching resources are fully used to conduct multimedia-assisted English teaching.

The designed multimedia-assisted English teaching system is established by installing the multimedia technology system on the hardware devices. From the perspective of game theory, this system is mainly composed of a web browser and server for unified management of the functional modules in the system. The software programs, database, and information in the server are called in accordance with the tasks issued by the system so as to reduce the workload on the user side effectively. The English teaching system based on multimedia is established from the perspective of the game theory to process the data in the backend database. With user services as the main object and target, the system can implement a reasonable arrangement of English course resources and also achieve the provision of assistance and support for multimedia-assisted teaching. The functions of the system proposed in this study mainly include four parts, that is, sign-in by students, teaching by teachers, learning by students, and education management (Figure 2).

4. Experiment and Result Analysis

The network topology of the language intelligent development method is shown in Figure 3.

The topology of a distributed network is used to support various identity rights in accordance with teachers, students, and administrators at the user level, with slightly different services. The proposed multimedia English intelligent development method mainly includes a supplementary training module, a multimedia-assisted teaching module, and an audiovisual training module, with the following logic diagram (Figure 4).

Database support is required for all modules at the backend. The system implementation is managed automatically based on the Oracle database to integrate and execute the overall resolution scheme. The list of database information includes test type, knowledge, test field, syntax, multimedia file, and answer. The data types and field contents of the aforementioned information list are displayed in Table 3.

The network topology of this language intelligent development method has described the environment in which the system is implemented through the combination of software and hardware, and the database server is configured in a server environment accordingly.

The effectiveness in the application of the method of developing English language intelligence implemented from

Table 2: Model for excellent students performing well in College English Test (CET) levels 4 and 6.

Input layer	Hidden layer (conversion function)				Output layer
	Field of reading	Range of vocabulary	Knowledge points	Grammar	
Language 16%	Finance 26%	Chapter 35%	Subordinate clause 26%	Article 22%	Grades 23%
Writing 4%	Economy 31%	Paragraph 15%	Slang 12%	Adverb 15%	Grades 11%
Listening 22%	Science and technology 13%	Sentence 25%	Reading 32%	Verb 13%	Grades 34%
Translation 8%	Politics 12%	Phrase15%	Voice 15%	Adjective 10%	Grades 16%
Reading 40%	History 13%	Word 10%	Vocabulary 8%	Noun 10%	Grades 16%
Correction of errors (COEs) 10%	Communication technology 5%		Tense 7%	Pronoun 30%	
Total 100%	100%	100%	100%	100%	Total 100%

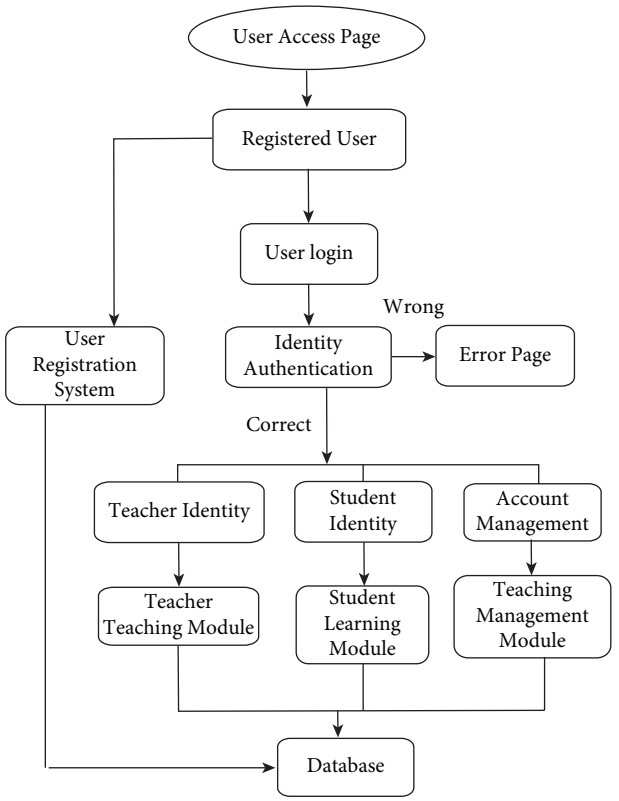

Figure 2: Teaching system functional chart based on multimedia.

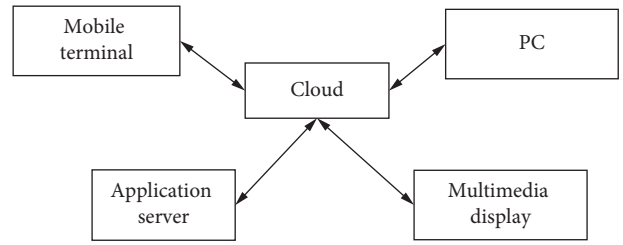

Figure 3: Network topology.

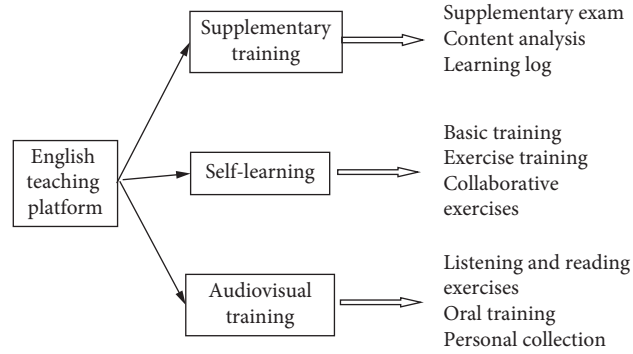

Figure 4: Logic diagram.

the perspective of game theory is assessed based on the results of English major students at Polytechnic University in the province, and the students at the School of Language in the class of 2020 at the university are selected. Here, the interface diagrams of listening and conversation practice modules are shown in Figure 5.

With regard to the students at the School of Language of the university in the class of 2020, a pass mark of 430 points in CET-4 is set, and a difference of 5% in the comparison result is considered significant. The CET-4 pass rates of 2019 class students in English major are compared with those of the 2020 class (who took the first CET-4) to see if there are obvious differences among the grades. The difference is 1.45% or so, which is very tiny and shows almost no difference. Subsequently, at the School of Language in the class of 2020, the situation of the students who have used the system and those who have not used the system in College English Test (CET) level 4 are compared. The results indicate that the students who have used the language intelligent development method have a higher pass rate and that the preference to use the system for exploration has a positive effect, as shown in Figure 6 and Figure 7.

Figure 7 shows a comparison graph of the simulation experiment when the number of multimedia is 100, while Figure 7 shows a comparison graph of the simulation experiment when the number of multimedia is 200. Meanwhile, the process of the simulation experiment is set to 10 times, and the corresponding mean value is obtained as the result of the experiment.

Figure 7 shows that the life cycle of the network from the perspective of game theory has been improved compared with that of the other algorithms when the number of nodes

Table 3: List of information in the database.

Name of field	Content in the field	Type of data	Restriction of category	Note
Type_id	Type number	Number (8)	Not null	Test type
Type_name	Type description	Varchar2 (80)		
Test_id	Test id	Varchar2 (2000)	Not null	Explanation of the test title
Knowledge_id	Knowledge code	Number(4)	Not null	
Knowledge_name	Knowledge description	(80)	Not null	Tense, vocabulary, etc.
Grammar_id	Grammar code	Number (4)	Not null	Grammar
Grammar_name	Grammar name	Varchar2 (80)	Not null	Nouns, pronouns, etc.
Area_id	Area code	Number(8)	Not null	
Area_name	Area name	Varchar2 (50)	Not null	Politics, economics, etc.
Question_text	Text in the question	Varchar2 (2000)		
Level_id	Level	Number (4)	Not null	
Diff_quot	Coefficient of difficulty	Number (4)	Not null	——
Creator_name	User who submits the test	Varchar2(30)		
Book_No	Test source	Number (20)		
Test_image	Test image	Varchar2 (250)		Name of the image file
Multimedia_text	Multimedia file	Varchar2 (250)	Not null	Name and directory of the file
Choice_text	Text of the choice	Varchar2 (2000)	Not null	
Answer_text	Text of the answer	Varchar2 (5000)	Not null	Text of the standard answer
Answer_note	Notes of the answer	Varchar2 (2000)		

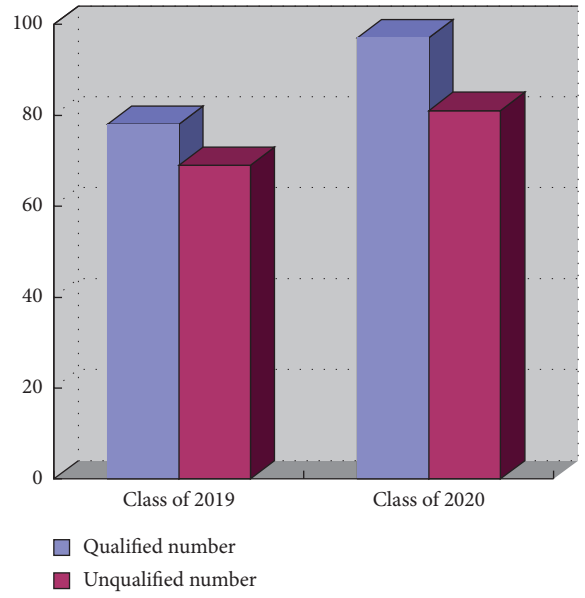

Figure 5: CET-4 pass rates of English majors in the classes of 2019 and 2020.

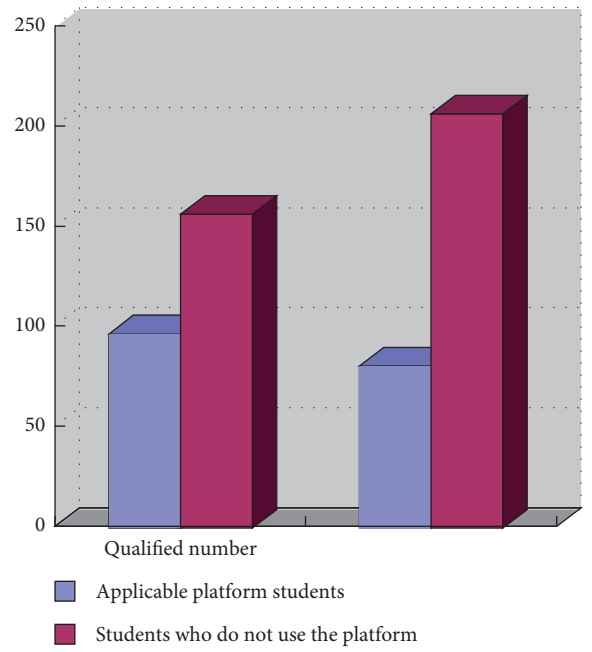

Figure 6: Pass rate comparison of students in the class of 2020, School of Languages, with/without the application of the system.

based on multimedia is 100; however, when the number of nodes based on multimedia is 200, the life cycle of the network from the perspective of game theory is still improved as compared to the corresponding network life cycle of the other algorithms. The comprehensive results indicate that the proposed perspective of game theory is evidently superior.

5. Conclusion

In response to the issues in the English teaching language intelligent development methods at present, an English teaching and learning system based on multimedia is designed in this paper from the perspective of game theory. On the basis of analyzing the multimedia-assisted theory of English learning, a language development method for multimedia-assisted teaching of college English is designed based on the game theory by applying multimedia technology to the teaching process of college English. The data on English learning and learners are collected in a centralized manner by using the system. The English teaching language content based on multimedia is broken down by using multilayer wavelet feature transformation, which can improve the communication of multimedia-assisted English teaching content effectively. Meanwhile, the perspective of game theory allows

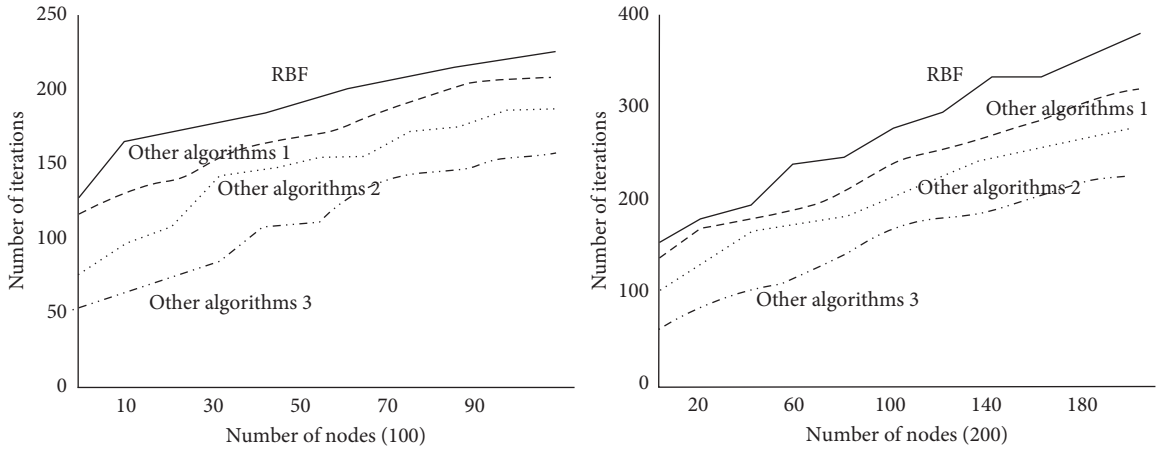

Figure 7: Life cycle of the network.

timely planning and adjustment of the English learning content of students in real time and simulates the rules related to English learning realistically and effectively for intelligent development of the English language. In this way, the English language intelligent development method can support students' learning process properly. The design is assessed, and the results show that it can achieve substantial improvement. The simulation experiment suggests that it is effective and can improve the results of English teaching in the classroom and improve the motivation of students to learn from the perspective of game theory.

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 no conflicts of interest.

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