Hindawi
Mathematical Problems in Engineering
Volume 2023, Article ID 9871078, 1 page
https://doi.org/10.1155/2023/9871078

Retraction

Retracted: Optimization of Classroom Teaching Strategies for College English Listening and Speaking Based on Random Matrix Theory

Mathematical Problems in Engineering

Received 13 September 2023; Accepted 13 September 2023; Published 14 September 2023

This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

(1) Discrepancies in scope
(2) Discrepancies in the description of the research reported
(3) Discrepancies between the availability of data and the research described
(4) Inappropriate citations
(5) Incoherent, meaningless and/or irrelevant content included in the article
(6) Peer-review manipulation

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

References

[1] D. Liao, "Optimization of Classroom Teaching Strategies for College English Listening and Speaking Based on Random Matrix Theory," *Mathematical Problems in Engineering*, vol. 2022, Article ID 8563978, 11 pages, 2022.

Hindawi
Mathematical Problems in Engineering
Volume 2022, Article ID 8563978, 11 pages
https://doi.org/10.1155/2022/8563978

Research Article

Optimization of Classroom Teaching Strategies for College English Listening and Speaking Based on Random Matrix Theory

Danlu Liao

Foreign Languages and International Tourism Department, Chongqing Vocational Institute of Tourism, Chongqing 409000, China

Correspondence should be addressed to Danlu Liao; 18402189@masu.edu.cn

Received 22 April 2022; Revised 20 May 2022; Accepted 24 May 2022; Published 18 June 2022

Academic Editor: Ning Cao

Online English teaching systems are more and more widely used in higher education teaching. Based on random matrix theory, this study constructs an optimization model of classroom teaching strategies for college English listening and speaking. By comparing and analyzing the universal properties of the research system and the random system matrix, the model can examine the random properties and special nonrandom properties within the system and solve the quantification problem of college English classroom education. First, based on the existing college English listening and speaking classroom teaching system, with the help of J2EE structure in information technology, the existing college English listening and speaking classroom teaching system is optimized, the customer layer, web layer, business logic layer, and student listening and speaking classroom learning effect management layer are designed, and the system is applied to college English listening and speaking classroom teaching. During the simulation process, a random matrix theoretical dynamics graph library and a subject library were written, so that combining the elements of each vector into a new matrix. Experiments show that the ensemble framework based on ranking learning can not only integrate multiple matrix factorization algorithm models to obtain better recommendation accuracy but also can more fully reflect the eigenvalues of each individual. The experimental results show that when the number of sampling points is 80 and the signal-to-noise ratio is −15 dB, the detection probability is close to 80%, which effectively improves the classroom random detection performance of English teaching and the effect of strategy optimization.

1. Introduction

In order to improve the quality of classroom teaching of college English listening and speaking and to encourage key colleges and universities to carry out college English education reform, foreign language teaching in colleges and universities emphasizes that college English should vigorously promote the integration of information technology and curriculum teaching and continue to give full play to modern educational technology, especially information technology in foreign language teaching [1]. In this process, teachers are encouraged to establish and use microcourses and MOOCs, use online high-quality educational resources to transform and expand teaching content, and implement hybrid teaching models such as flipped classrooms based on classroom and online courses, so that students can move towards active and autonomous learning [2]. However, the problems faced in the actual college English listening and speaking teaching are as follows: first, the number of college English teachers is limited, and the college English listening and speaking class generally adopts the traditional large-class teaching method; second, the students have complex professional backgrounds and higher English listening and speaking abilities [3], and teachers cannot take into account the development of each student's English proficiency. In recent years, many colleges and universities are also trying to carry out curriculum reform on college English listening and speaking classroom, such as flipped classroom teaching mode, microclass teaching mode, class teaching mode, hybrid teaching mode, most of them complete resource sharing and learning through online course learning platform and simply connect online and offline classroom learning. The interaction between students has not changed substantially.

In recent years, the application of online homework systems in higher education teaching has become more and more extensive. The survey and statistical results show that most of the current online homework systems for random matrix theory courses are mainly multiple-choice and fill-in-the-blank questions. There are very few homework systems for random matrix theory calculation problems. Therefore, it is very important to improve the effect of college English listening and speaking classroom teaching with the help of information technology [4]. Integrating teachers, students, resources, and data through a variety of intelligent technologies in information technology, information technology has become a learning tool for students in college English listening and speaking class. While recording students' and teachers' teaching data, it has become a key research problem to help students improve their listening and speaking ability and promote students' English learning achievement in listening and speaking class [5]. Therefore, with the help of more information technology, relevant researchers have developed many systems and methods to optimize college English listening and speaking classroom, effectively optimized college English listening and speaking classroom teaching strategies and improved the quality of classroom teaching.

Reference [6] uses information technology to design an English distance multimedia teaching system based on virtual reality. The system uses a 3D scanner to assist in modeling in the form of 3D detection, a 3D visual display device displays a virtual teaching 3D scene, and interactive devices such as gloves and joysticks send learning instructions, receive teaching information feedback, and implement a teaching system on hardware. The facets are used to simulate physical surfaces, the module size is adjusted in the virtual teaching scene with reference to the error function, and the module pixels are adjusted according to the pixel resolution calculation formula to construct a virtual scene and simulate the device function and complete the response function. The design of the teaching system based on virtual reality is realized through the triggering of teaching program, data transmission, and format conversion. The human-computer interaction ability of the English distance multimedia teaching system is stronger, and the students are more interested in learning. It is suitable for college English listening and speaking. Students' listening and speaking ability can be improved in the classroom, but the development process of the system is relatively complicated and is greatly affected by external interference. Reference [7] designed a teaching experience system based on wearable human perception. Through this system, we can improve the teaching strategies of college English listening and speaking classroom. Based on the analysis of human mechanism perception information science theory and interactive technology achievements, the system systematically studies the problems of human perception and environmental perception, human mechanism perception information acquisition, the relationship between perception and memory, human-computer interaction perception and input mechanism, VR human-computer information acquisition in 5G environment, virtual learning environment design, and so on. Aiming at the weakness of lacking objective perception feedback design and unable to effectively obtain control variables in virtual reality teaching design, the design idea of virtual reality controllable learning experience environment based on human mechanism perception is proposed, and the design model of wearable learning experience system is designed. The design of immersive experience course in human perception environment is tried, and the control design of virtual teaching experience space is partially realized. However, the development cost of the system is high and it is not easy to realize, which is difficult to realize in the optimization of college English listening and speaking classroom teaching strategies.

In order to effectively save the time spent by teachers on homework correction and grade statistics and to comprehensively assess students' mastery of the English teaching part of random matrix theory, this article refers to the current mainstream online homework system design model, and a powerful editing library has established an online platform for English teaching assignments of random matrix theory. By using information technology to develop a simple and easy-to-use college English listening and speaking classroom teaching system, the optimization method of college English listening and speaking classroom teaching strategy design is realized.

2. Materials and Methods

2.1. Optimization of Teaching Strategies Based on Random Matrix Theory. The rapid development of information technology has created more possibilities and choices for English listening teaching. From multimedia technology to the application of computer and network technology, English listening teaching has made great progress in theory and practice. Starting from the current situation of college students' English listening and speaking classroom teaching, this study explores and designs a new listening and speaking classroom teaching mode based on a variety of information technologies [8], in order to improve college students' comprehensive English ability and basic literacy, so as to promote the development of college students.

2.2. Overall Architecture of College English Teaching System Based on Random Matrix Theory. In order to improve the classroom strategy optimization of college English listening and speaking classroom teaching, based on the existing system, this study uses J2EE technology to optimize the overall architecture of college English listening and speaking classroom teaching system. Based on the J2EE standard edition, this information technology adopts enterprise application function, and J2EE provides a solution for enterprise level [9].

The information technology includes XML, JSP, servlet, and EJB. J2EE has platform independent characteristics, that is, the characteristics of Java language. J2EE adopts multi-level structure, which is centered on components and servers. That is, different components work on different equipment. Its working principle is to separate the software business logic and the underlying services of the software. In this study, the college English listening and speaking classroom teaching system is added to the outer layer of the logical structure of J2EE. Python is used to write the data in the question into an executable matrix algorithm program and store the unit information, node information, constraint information, load information, and acceleration information involved in the random matrix theory dynamic English teaching in the specified vector respectively, and randomly, the combined method reorganizes the elements in each vector into a new matrix. Each row vector in the matrix represents a type of question type. If each learner can be assigned a weight, and the weight can measure the importance of its corresponding learner in forming the ensemble, then the weight can be used to determine which learners should be kept and which should be eliminated. The system background calls executable algorithm programs to form a large number of English teaching topics, English teaching problems, problem solutions, and schematic diagrams of the plane structure and store them in the database. Therefore, a large number of different random questions can be formed according to needs, which greatly increases the number of questions in the question bank. The overall architecture of the designed college English listening and speaking classroom teaching system is shown in Figure 1.

As can be seen from Figure 1, the college English listening and speaking classroom teaching system developed in this study with the support of information technology mainly includes customer layer, web layer, business logic layer, and student listening and speaking classroom learning effect management layer. Among them, the client layer is a web-based page. Its main function is to provide users with an operation display interface. It displays the markup language in the browser by communicating with the J2EE server on JSP pages and servlets. These markup languages are generated by web components in the web layer [10]. First, a user-product rating matrix is constructed based on the user's historical behavior information; second, the similarity between user questions or products is calculated, and the user or product with higher similarity is used to predict the target user's score on the target; finally, the engine recommendations are based on predicted scores. JSP technology and servlet technology constitute the web layer. Among them, JSP technology is a text-based document. It generates the corresponding servlet [11] in the web container by embedding components, so as to draw a clear line between application logic and presentation logic. Servlet technology is a server-side program that allows application logic to enter the response process when an HTTP request responds. Its structural diagram is shown in Figure 2.

The business logic layer is composed of independent EJB components and containers. It is the core component of the application system. Its main function is to deal with enterprise business. When the web layer sends a request to the EJB component, the corresponding EJB component will automatically accept the information and data business for processing. Each row vector in the matrix represents a type of question type. According to the classification of the question type in the matrix, a general drawing program is written to draw the schematic diagram of the load, structure, and constraint corresponding to the question. The system background calls executable algorithm programs to form a large number of English teaching topics, English teaching problems, problem solutions, and schematic diagrams of the plane structure and store them in the database. Therefore, a large number of different random questions can be formed according to needs, which greatly increases the number of questions in the question bank.

2.3. The Classification of the Question Type of College English Teaching Strategy Index System. Compared with the traditional detection method, the English teaching perception algorithm based on random matrix theory has more advantages, mainly through the projection of the target English teaching signal feature subspace on the experience spectrum; because the projection of the English teaching signal of the main users on the empirical spectrum is often concentrated on several eigenvalues, the energy of the English teaching signal is more concentrated. In the cosine similarity calculation method, the problem of scoring scales of different users is not integrated. Some severe users tend to give low scores, while some loose users tend to give high scores. In order to eliminate this difference in scoring scales, we update the correction to standard cosine similarity. According to this feature, the target English teaching signal can be reflected from the noise, so it is more advantageous under the low signal-to-noise ratio. Therefore, this study constructs the college English listening and speaking classroom teaching strategy index system [12], takes the index system as the basis of strategy optimization, and completes the research of this method. In the college English listening and speaking classroom teaching strategy index system, it mainly aims at students and teachers. Among them, students mainly study their learning objectives of English listening and speaking, interests, and hobbies in English learning, vocabulary, memory, and learning time. The classroom teaching strategy indicators of college English listening and speaking are listed in Table 1.

After the college English listening and speaking classroom teaching strategy indicators are determined, students' listening and speaking course learning plan is also very important. The main contents include number of words, word content, learning frequency, time required to complete a single learning, completion stage, forgetting rate, etc.

In college English listening and speaking classroom teaching, teachers' main teaching methods are the key to improve students' levels. Therefore, it is very important to determine the indicators of teachers' teaching strategies in college English listening and speaking classroom teaching. The teaching strategy indicators of teachers are listed in Table 2.

After constructing an index system of college English listening and speaking classroom teaching strategies for different objects, it is necessary to calculate the weights of the above indicators to determine the proportion of subsequent

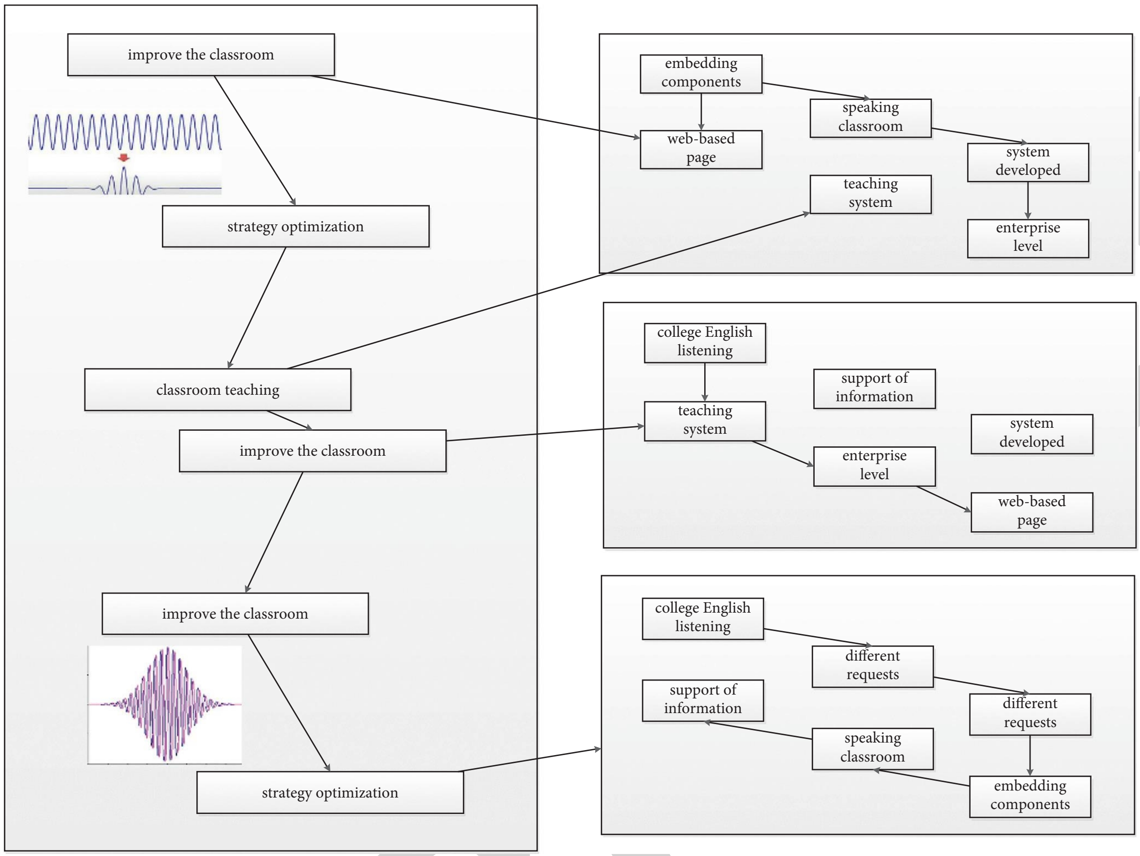

Figure 1: Overall structure of college English listening and speaking classroom teaching system supported by information technology.

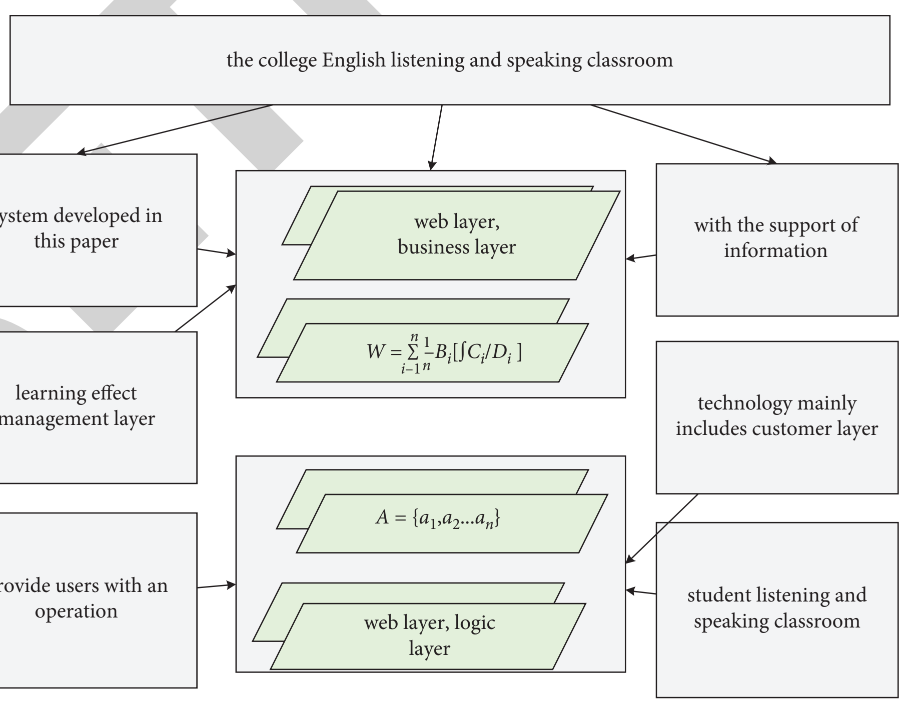

Figure 2: Schematic diagram of working structure of web layer.

Table 1: Indicators of classroom teaching strategies for college English listening and speaking.

Index	Content
Learning target	College English level test goals to improve the learning level
Hobbies and interests	Push learning interest and hobby resources
Initial vocabulary and grade	Vocabulary level and combined with learning objectives
Memory preference	Words memory effect
Memory level	The percentage of memory in a specified time
Learning time	Learners remember the vocabulary since using the system

Table 2: Teaching strategy indicators of teachers in college English listening and speaking classroom teaching.

Index	Content
Listening and speaking about the classroom teaching objectives	Clear teaching objectives, better improve the learning level
Listening and speaking classroom teaching mode design	The weight set to determine the classroom teaching strategies of college English listening and speaking
Identification of the initial vocabulary and rank	Determine the vocabulary level of different students, combined with the teaching objectives
Teaching mode of words in listening and speaking	Calculate the weights of the above indicators
Heard and hear about teaching level	After the fixed teaching mode, determine the students' learning ability
Teaching time	Determine the proportion of subsequent strategy optimization

strategy optimization [13, 14]. The weight set to determine the classroom teaching strategies of college English listening and speaking is as follows:

$$A = \{a_1, a_2 \ldots a_n\}. \quad (1)$$

Assuming that B_i represents each individual indicator and C_i and D_i represent the hierarchy of evaluation, the weight W of each index is determined as follows:

$$W = \sum_{i=1}^{n} \frac{1}{n} B_i \left[\int C_i \frac{(1 - \exp(i))}{D_i (1 - \exp(i))} \mathrm{d}i \right]. \quad (2)$$

Among them, n represents the number of college English listening and speaking classroom teaching strategy indicators.

After determining the index weight of different university English listening and speaking classroom teaching strategies, the importance of different indicators is calculated with the help of fuzzy comprehensive evaluation method. The construction of the fuzzy relationship matrix is as follows:

$$Q = \begin{bmatrix} q_{11}, q_{12} \cdots q_{1m} \\ q_{21}, q_{22} \cdots q_{2m} \\ \cdots\cdots \\ q_{n1}, q_{n2} \cdots q_{nm} \end{bmatrix}. \quad (3)$$

Among them, q_{nm} represents the fuzzy subset membership in the evaluation set, according to which the different college English listening and speaking classroom teaching strategies can be effectively evaluated, so as to realize the optimization of college English listening and speaking classroom teaching strategies.

2.4. The Effectiveness Case of College English Listening and Teaching Strategy. English teaching perception algorithms based on RMT can be divided into two categories: covariance matrix-based and progressive spectrum-based English teaching perception algorithms. For the covariance matrix, the distribution of the covariance matrix or the structure of the covariance matrix can be directly used for English teaching perception. The data are used in S to form a new replica training set S, t is called the training subset of S, how many t and S are generated depends on the scale of the integration, and if the scale of the integration is 20, then 20 training subsets t, S are generated. In the specific implementation, a random function is used to generate a random value from 0 to 1, and it is expanded n times according to the number n of samples in the training set S. Therefore, in the optimization of college English listening and speaking classroom teaching strategies, first, the effective correction of students' errors in listening and speaking learning in teaching is calculated, and the correction formula is expressed as follows:

$$\text{erro} = \frac{\sum_{i=1}^{n} \left| g_i (1 + \exp(i)) \cap r_i (1 + \exp(i)) \right|}{\sum_{i=1}^{n} r_i (1 + \exp(i))}. \quad (4)$$

Among them, erro represents the error in students' listening and speaking learning, g_i represents the degree of error, and r_i represents the standard error value.

According to the students' listening, speaking, and learning, in order to comprehensively correct the students' errors, the overall errors are further corrected, and we get

$$P = \frac{\sum_{i=1}^{n} \left| g_i (1 + \exp(i)) \cap r_i \right| (1 + \exp(i))}{g_i}, \quad (5)$$

where P represents the proportional value of the global correction.

By inputting the above determined error data into the optimized listening and speaking teaching system, it can be divided into local and global by attention mechanism [15], and its teaching strategy can be optimized in combination with the correction of the system. The structure of attention mechanism is shown in Figure 3:

In the attention mechanism structure, the errors in different aspects of students' listening and speaking learning are input into different hidden states, and the actual state of students' listening and speaking learning is determined according to the hidden different state variables. The following results are obtained:

$$\alpha_{ij} = \frac{\exp\left(u_{ij}\right)}{\sum_{i,j}^{n}\left(s_{i-1}\left(1+\exp(i)\right), h_j\left(1+\exp(i)\right)\right)}, \tag{6}$$

where u_{ij} represents the hidden state in the attention mechanism and h_j represents the hidden state variables. Therefore, different weights can be assigned to different component learners. For example, when recording the total number of votes, one vote of a component learner with a higher weight is recorded as two votes, and the final output is the weighted vote.

On the basis of determining the learning status of students' English listening and speaking classroom under different teaching strategies, combined with the above-determined college English listening and speaking classroom teaching strategy indicators, this study uses the random forest method [16, 17] to construct the optimization model of college English listening and speaking classroom teaching strategy and realize the research of strategy optimization method. A random forest is a classifier that contains multiple decision trees. Therefore, using the random forest method, we must first build a decision tree. Python is used to write the data in the question into an executable matrix algorithm program and store the unit information, node information, constraint information, load information, and acceleration information involved in the random matrix theory dynamic English teaching in the specified vector respectively, and randomly, the combined method reorganizes the elements in each vector into a new matrix [18, 19].

This part takes the optimization index of classroom teaching strategy as the data set to construct the process of decision tree. The database reflects the optimization indicators of classroom teaching strategies, namely, "characteristics" [20]. The original matrix has no missing elements, but in a real scenario, a large number of missing values (with predicted data) in the known scoring matrix are usually used to learn the matrix by gradient descent [21]. The predicted elements in the matrix gradually approach the true value. The formula of the improved recommendation algorithm based on matrix factorization is shown in equation (7). Accordingly, the attribute set of the database is recorded as follows:

$$V = \left\{v_1, v_2 \ldots v_p\right\}. \tag{7}$$

The indicator database p contains 32-dimensional attributes with multiple possible values per dimensional attribute. In this study, the classroom teaching strategy optimization index as h_1 is first marked as a sample set, where 32 indicators of the optimization strategy exist. If the index a is used to divide the training set D, produce a branch, and generate a node, then the k branch represents the sample of a on the feature, which is marked as D_k. The calculation formula is as follows:

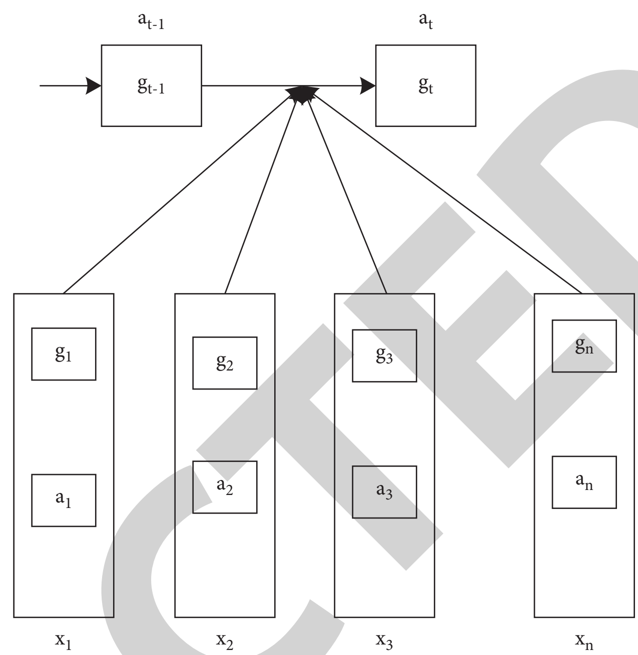

Figure 3: Attention mechanistic structure.

$$D_k = -\sum_{h=1}^{y} p_q \log_2 p_q. \tag{8}$$

Among them, p_q represents the proportion of samples in the current sample set, which is the proportion of important indicators of classroom teaching strategy [22, 23].

Considering the different number of samples contained by different branch nodes, this study assigns weight D_k/D to the branch nodes, so we can calculate the information gain obtained by dividing the sample set D_k with attribute a, that is, the information gain obtained after the policy optimization, indicating the effect of the policy optimization, and the optimization model is as follows [24]:

$$\varphi(D,a) = D_k - \sum_{k=1}^{v}\left|\frac{D_k}{D}\right| D_k. \tag{9}$$

Among them, $\varphi(D,a)$ represents the optimization output results of college English listening and speaking classroom teaching strategy.

Under the assumption $H1$, when the English teaching signal of the main user exists, due to the correlation of the English teaching signal of the main user, the sampling covariance matrix of the received English teaching signal is an off-diagonal matrix. The test is performed using the different structures of the statistical covariance matrices under the two hypotheses. When the value of N is large, the sampling covariance matrix can be approximated as the statistical covariance matrix [25]. More sampling points can obtain better detection performance. Because the condition for using the asymptotic spectrum theory is $\mathrm{MN} = e$, it is impossible to take an infinite number of samples in practice. It can be seen from the analysis that as long as the number is relatively large, it can be considered that the number of samples is large enough. The larger the number of samples, the more the condition of the sample size $K = e$ can be satisfied, so the larger the sample size, the better the detection performance can be obtained. Because the weight of the wrongly classified sample will be relatively large, and the weight of the correctly classified sample will be relatively small. The samples in S are sorted in descending order of weight, so that the misclassified samples will be ranked first, and the nonmisclassified samples will be ranked last. Each time a sample is taken from S, and it is extracted in sequence, from the 1st to the mth in the training set S, so that the probability of a wrongly classified sample being selected will increase.

Assuming M trees in the forest, the average of the error value difference of M trees was calculated to represent the importance of features. The random noise was added to study the change of prediction error rate, select the optimization output results of college English listening and speaking classroom teaching strategy, and obtain the final optimization results:

$$\delta(x) = \arg\max_{\delta\in D} \varphi((D(x = 1, 2, 3, \ldots, a)), a). \tag{10}$$

Specifically, $\delta(x)$ represents the correction results after policy optimization.

Using AJAX technology, the answers filled in by the students on the front end of the Internet are transmitted to the backend server, they are compared with the correct answers in the backend system, and the result of the comparison is returned to the front interface of the system. Since the front-end of the system is a dynamic page design, there is no page reloading in the whole process, and the comparison of the entire data is completed in an instant. It is convenient for students to get feedback on their answers in a timely manner after entering their answers on the website and to know how well their homework is completed. The random forest method builds the optimization model of the classroom teaching strategy of college English listening and speaking and uses the existing data to revise the output of the optimization model, which realizes the optimization of the classroom teaching strategy of college English listening and speaking.

3. Results and Discussion

3.1. Experimental Scheme. In order to verify the effectiveness of the designed optimization method, experimental analysis was carried out. The data used in the experiment come from the SED database, which selects the relevant college English listening and speaking classroom teaching strategy optimization data and conducts experiments on the SED database. The database is set as a training set and test set with a ratio of 4 : 1. This study mainly studies the impact of index changes on data.

Although these asymptotic results can provide precise limit results when the number of English teaching samples or matrix dimensions tends to infinity, they cannot describe the rate, at which these probabilistic behaviors converge to the limit value. To solve this problem, nonasymptotic theories have emerged to study these probabilistic behaviors. First, some basic small deviation results for random matrices are presented. Then, under the conditions of negative moment estimation of the largest eigenvalue and bounded eigenvalues, several types of small deviation inequalities for the largest eigenvalues of the sum of independent random PSD matrices are obtained. These small deviation inequalities are independent of the matrix dimension, the results are suitable for high-dimensional or even infinite-dimensional matrices, and the small deviation inequalities of random PSD matrix sums are independent of the length of the English teaching sequence. Infinitely separable distributions include Gaussian distribution, Poisson distribution, stable distribution, and special composite Poisson distribution. Except for Gaussian distributions, there is no intersection between infinitely separable distributions and subGaussian distributions. RM will test the training set S, generate misclassified samples and samples that are not misclassified, and update the weight value of the samples according to this difference. When the RM goes to test the training set S, it will generate a value αt, which will vary according to the number of misclassified samples. The specific college English listening and speaking classroom teaching strategy index data and experiment-related data settings are listed in Table 3.

In this experiment, taking the second grade English majors in a university as the research object, all the students are selected in a class, the optimization strategy is applied in this study to this method, the changes of students' academic performance are tested after the application of this strategy, and the effectiveness of the design method by the changes of their performance is judged. In the experiment, the methods of literature [6, 7] are used as comparison methods, and the three methods are compared. In the experiment, first, the calculation error of the weight of the optimization index, the improvement range of students' performance after optimization, and the accuracy of correcting students' English listening and speaking errors in the design system are analyzed.

3.2. Analysis of Experimental Results. In order to verify the effectiveness of the proposed method, the experiment analyzes the error of the proposed method and the methods of literature [6, 7] in the calculation of index weight in the optimization of college English listening and speaking classroom teaching strategy. The recommendation method based on implicit trust recommends the items that trusted neighbors like to target users according to the inferred implicit trust relationship between users and their neighbors. Generally speaking, the recommendation method based on implicit trust is also divided into three steps: first, the implicit trust relationship is inferred between the user and neighbors; second, the user's most trusted neighbor set is filtered out; finally, the user's preferences are predicted and recommendations are made. When the number of sampling points is different, the detection performance of

Table 3: Experimental data settings.

Parameter	Content
Number of experimental students (person)	50
Policy indicator data (individual)	200
Control set data (individual)	150
Experimental group data (individual)	150
Experimental error (%)	[0, 1]
The mistake (a)	100
Iteration time (s)	5

the MER algorithm is shown as follows: simulation parameters: $K = 50$ and N increased from 20 to 100. It can be seen from the simulation curve that when the signal-to-noise ratio is the same, as the number of sampling points increases, the detection probability increases gradually, and it is the case where the detection probability of the MER algorithm changes with the number of sensing nodes. It can be seen that when the signal-to-noise ratio remains unchanged, increasing the number of sensing nodes can obtain a higher detection probability. The selection of index directly affects the effect of strategy optimization. Therefore, the experiment first compares the error of the three methods in the calculation of index weight, and the results are shown in Figure 4.

By analyzing the experimental results in Figure 4, it can be seen that there are some differences in the error of index weight calculation in the optimization of college English listening and speaking classroom teaching strategies by using the proposed method and the methods of literature [6, 7]. When there are many misclassified samples, it means that the effect of the subclassifier on the training set S is not very good, and the value of αt is relatively small; when there are few misclassified samples, it means that the effect of the subclassifier on the training set S is better, and the value of αt is relatively small. However, from the overall trend, the calculation error of the proposed method is lower than that of the other two methods and is lower than 4% at the beginning. This is because the proposed method determines the weight of key indicators before optimization, improves its calculation error, and verifies that the proposed method can well determine the indicators of strategy optimization and improve the feasibility of the proposed method.

The experiment analyzes the improvement rate of students' performance after optimizing the teaching strategy of listening and speaking classroom by using three methods to verify the feasibility of the optimization method. The samples are the element distribution of the eigenvector corresponding to the minimum eigenvalue of the empirical cross-correlation matrix and the random correlation matrix, respectively. It can be seen from the above that the element distribution of the eigenvector corresponding to the minimum eigenvalue of the random correlation matrix still approximately obeys the standard normal distribution, while the empirical cross-correlation matrix corresponds to the element distribution of the eigenvector. The distribution of eigenvector elements corresponding to the minimum eigenvalue of the matrix is mainly concentrated around 0,

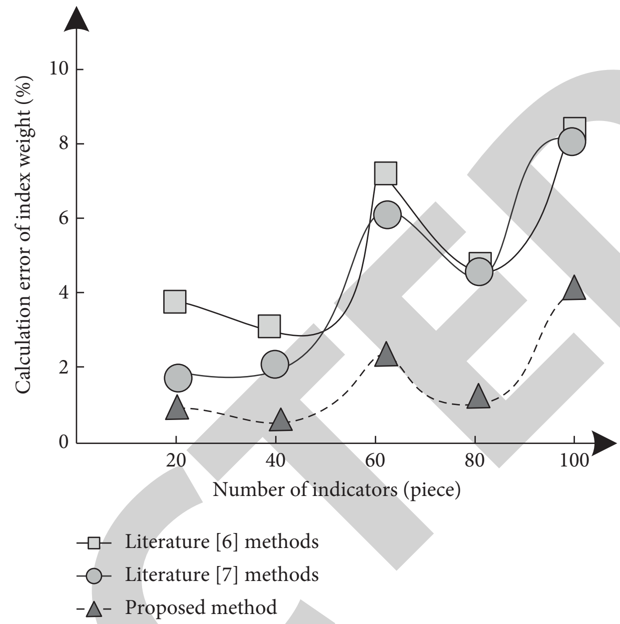

Figure 4: Comparison of error calculation of index weights by different methods.

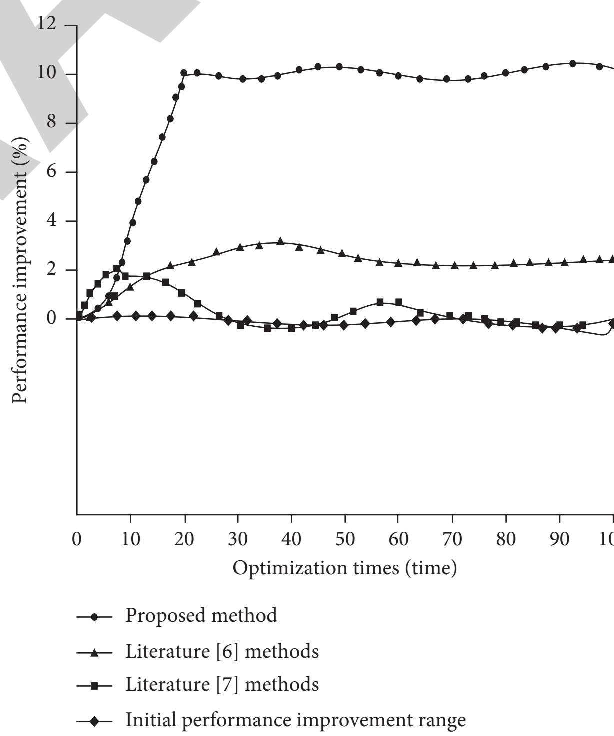

Figure 5: Analysis of the student performance improvement range after optimizing the listening and speaking classroom teaching strategy.

which also suggests that the eigenvectors smaller than the lower limit of RMT prediction may also be random and contain noise information, which is also the reason why we use RMT to analyze the empirical correlation matrix. Several

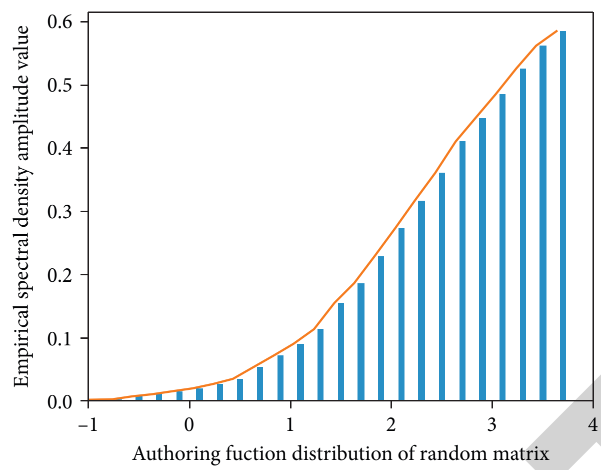

Figure 6: Empirical spectral density function distribution of random matrix.

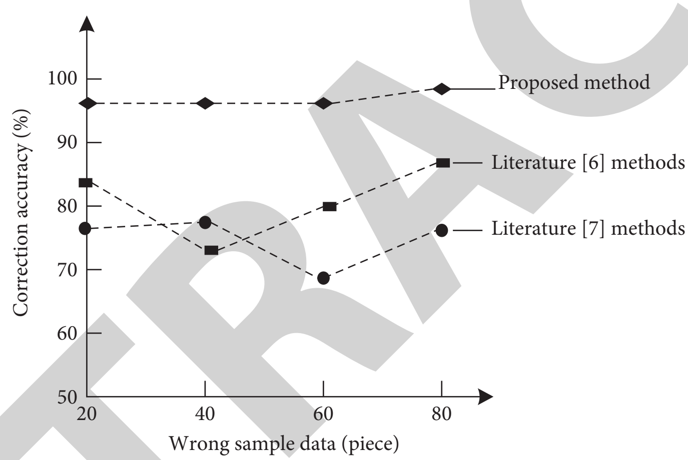

Figure 7: Accuracy analysis of English listening and speaking error correction of students with different methods.

small eigenvalues and eigenvalues close to the upper limit of RMT predicted eigenvalues have relatively large inverse proportional parameter rate (IPR) values of eigenvectors. The eigenvalue of the upper limit of the eigenvalue corresponds to the eigenvector with a smaller inverse proportional parameter rate (IPR) value. This may be due to the fact that the eigenvectors corresponding to the eigenvalues at both ends of the RMT prediction eigenvalue interval can represent relatively few English teaching sequences of stock returns. The experimental results are shown in Figure 5.

By analyzing the experimental results in Figure 5, it can be seen that there are some differences in the improvement of students' performance after optimizing listening and speaking classroom teaching strategies by using the proposed method and the methods of literature [6, 7]. Among them, compared with the initial performance improvement range, the improvement range of the method in this study is the highest, and the later improvement range is relatively stable. Although the method in document [7] is the fastest in the initial improvement range, it shows a downward trend in the later period, and the improvement range is low. Although the method in document [6] shows an improvement state, it is lower than the method in this study. If the channel between the cognitive user and the main user is a Rayleigh channel, the English teaching sample matrix X composed of the received English teaching signal obeys a real (complex) Gaussian distribution, and the corresponding sampling covariance matrix is a Wishart matrix. At this time, the sampling covariance matrix can represent the statistical characteristics of the channel and the English teaching signal. Bootstrap is used to generate T training subsets with m samples, and then each training subset is trained with RbfSVC to get T RM classifiers. The RM classifiers are tested separately with the test set, then the results of these classifiers are integrated by voting method, and finally, the result of the Bagging_RM ensemble classifier is obtained. Therefore, it is very important to study the eigenvalue distribution of this type of matrix. It can be seen that when the matrix dimension is as small as 100 and 200, the actual empirical spectral density is quite different from the theoretical curve. When the matrix dimension is large enough to be 500 and 1000, the actual empirical spectral distribution is basically within the range of the theoretical curve. The definition requires dimension $N = 100$; but in fact, as long as the dimension N is the largest, it can be considered that the empirical spectral density function of the Winger matrix obeys the semicircle law, as shown in Figure 6.

In this experiment, the listening and speaking ability data of the above designed experimental samples are input into the proposed system and the systems in documents [5, 6] to analyze the accuracy of students' English listening and speaking error correction. An online homework platform was established, and the questions were uploaded to the front-end interface of the network platform. In AdaBoost_RM, the sampling method is as follows: first, the weight of the samples in the training set in DNA is initialized, the initial value of the weight of each sample is set to 1 PS $N = 1/1/1000$, and each weight is related to the sample. Points correspond one to one and are associated with sample points. The weight of each sample point is changed after each iteration of learning. The first m samples are selected in the training set to generate a training subset, this training subset is used to train the RM, and a sub-RM classifier t RM is generated. The educational administration system designed based on the Django framework is used for the management of teaching activities with homework as the main content and can also be used to manage English teaching question banks and assign school indicators for assignment of completed homework; designed student homework system for students is requested to answer on the front-end page of the network platform. The experimental results are shown in Figure 6:

By analyzing the experimental results in Figure 7, it can be seen that the accuracy of correcting English listening and speaking errors of students with different methods is different. Among them, the accuracy of using the proposed method to correct students' English listening and speaking errors is higher, which is always higher than 90%, while the accuracy of the other two methods is lower than that of this method. It can be seen from the discussion that when performing a classification task, after training multiple learners, selecting a part of them for integration is expected to be better than using all learning periods for integration. Therefore, it can be seen that the effect of using this method is better.

4. Conclusion

Optimizing the classroom teaching strategy of college English listening and speaking is the key to improving students' English levels. Therefore, this study designs a new strategy optimization method for college English listening and speaking teaching strategy supported by information technology. The article has compiled a random matrix theory English teaching graphics library and a topic library and stored the unit information, node information, constraint information, load information, and acceleration information involved in the random matrix theory English teaching problems in the specified vectors, respectively, to reorganize the elements in each vector into a new matrix. Each row vector in the matrix represents a type of question type. According to the classification of the question type in the matrix, a general drawing program is written to draw the schematic diagram of load, structure, and constraint corresponding to the question. The same is true for AdaBoost_RM. In the case of a small number of classifiers, the effect of boosting after integration is not as good as that of a large number of classifiers. However, the cost of increasing the number of classifiers is an increase in computing time, and how to choose the appropriate number of classifiers depends on the specific situation. Compared with traditional methods, the method proposed in this study has certain advantages, and it is feasible to improve students' English listening and speaking abilities.

Data Availability

The data used to support the findings of this study are included within the article.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Acknowledgments

This work was supported by Chongqing Education Committee Technology Project under grant nos. Z212053 and KJQN2020004605 and China National Foreign Languages Guidance Committee of Ministry of Education under grant no. WYJZW-2021-105.

References

[1] Y. Yu and Y. Tang, "The construction of hierarchical network model and wireless activation diffusion optimization model in English teaching," *EURASIP Journal on Wireless Communications and Networking*, vol. 20, no. 1, pp. 163–170, 2020.

[2] A. Meghdadi and M. R. Akbarzadeh-T, "A stigmergic approach to teaching-learning-based optimization for continuous domains," *Swarm and Evolutionary Computation*, vol. 62, no. 23, Article ID 100826, 2020.

[3] W. Su, "How to use modern teaching methods to improve English Chinese translation ability," *Open Access Library Journal*, vol. 8, no. 12, p. 6, 2021.

[4] L. Shen and F. L. Department, "Study on the teaching practice of college English listening based on post-method theory," *Education Teaching Forum*, vol. 15, no. 3, pp. 789–793, 2020.

[5] E. Duran, *Teaching English Learners in Inclusive Classrooms*, Charles C Thomas Publisher Ltd, vol. 1243, pp. 478–483, Springfield, IL, USA, 4th edition, 2020.

[6] P. Li and Z. F. Song, "Design of English long-distance multimedia teaching system based on virtual reality," *Modern Electronics Technique*, vol. 43, no. 14, pp. 161–169, 2020.

[7] L. P. Jiang, X. P. Li, L. Zhang, J. Z. Chen, and Y. Y. Dong, "Design of virtual teaching experience space system based on wearable human body perception," *China Educational Technology*, vol. 14, no. 12, pp. 29–35, 2020.

[8] D. Jing and X. Jiang, "Optimization of computer-aided English teaching system realized by VB software," *Computer-Aided Design and Applications*, vol. 19, no. 1, pp. 139–150, 2021.

[9] L. Liu and R. Zhou, "Optimization of oral English teaching system based on computer-aided technology," *Computer-*

Aided Design and Applications, vol. 14, no. 3, pp. 147–157, 2020.
[10] T. T. H. Thuy and S. A. Qalati, “Preschool teachers’s attitude towards the integration of information technology into English teaching for young children in Vietnam,” *Int. J. Exconomics Commer. Manag*, vol. 8, pp. 279–294, 2020.
[11] M. Ezz and A. Elshenawy, “Adaptive recommendation system using machine learning algorithms for predicting student’s best academic program,” *Education and Information Technologies*, vol. 25, no. 4, pp. 2733–2746, 2020.
[12] Y. Jiang and X. Li, “Intelligent online education system based on speech recognition with specialized analysis on quality of service,” *International Journal of Speech Technology*, vol. 23, no. 3, pp. 489–497, 2020.
[13] R. Scherer, F. Siddiq, and J. Tondeur, “The technology acceptance model (TAM): a meta-analytic structural equation modeling approach to explaining teachers’ adoption of digital technology in education,” *Computers & Education*, vol. 128, pp. 13–35, 2019.
[14] L. T. N. Diep and V. M. Hieu, “Examining quality of English language learning of university students in vietnam: the moderating role of competition factor,” *European Journal of Educational Research*, vol. 95, pp. 55–79, 2021.
[15] K. Limsathitwong, K. Tiwatthanont, and T. Yatsungnoen, “Dropout prediction system to reduce discontinue study rate of information technology students,” in *Proceedings of the Business and Industrial Research (ICBIR)*, pp. 110–114, IEEE, Bangkok, Thailand, May 2018.
[16] Y. H. Lai, “The application of meta-analytic SEM on exploring factors that influence teachers’ usage of interactive whiteboard,” *Pedagogical Research*, vol. 4, no. 3, 2019.
[17] O. Barabash, A. Musienko, and S. Hohoniants, “Comprehensive methods of evaluation of efficiency of distance learning system functioning,” *International Journal of Computer Network and Information Security*, vol. 13, no. 1, 2021.
[18] W. Lu, G. N. Vivekananda, and A. Shanthini, “Supervision system of English online teaching based on machine learning,” *Progress in Artificial Intelligence*, vol. 2, pp. 1–12, 2022.
[19] Z. Tian, “Research on optimization of college English classroom teaching based on computer network environment,” *Journal of Physics: Conference Series*, vol. 16, no. 4, pp. 420–425, 2020.
[20] G. Luo, *Integration and Optimization of College English Teaching Information Resources in the Context of Big Data*, Springer, vol. 44, no. 36, , pp. 45–49, New York, NY, USA, 2020.
[21] T. Thaher, M. Mafarja, and H. Turabieh, “Teaching learning-based optimization with evolutionary binarization schemes for tackling feature selection problems,” *IEEE Access*, vol. 36, no. 25, pp. 1–9, 2021.
[22] Y. Ma, X. Zhang, and J. Song, “A modified teaching-learning-based optimization algorithm for solving optimization problem - ScienceDirect,” *Knowledge-Based Systems*, vol. 7, no. 4, pp. 32–39, 2020.
[23] A. V. Lakshmi, P. Mohanaiah, and Woa-Tlbo, “Whale optimization algorithm with Teaching-learning-based optimization for global optimization and facial emotion recognition,” *Applied Soft Computing*, vol. 25, no. 10, pp. 7623–7629, 2021.
[24] A. Khaira, R. K. Dwivedi, and S. Jain, “Review of structural health monitoring attributes optimization with multiple regression and teaching learning based optimization,” *IOP Conference Series: Materials Science and Engineering*, vol. 1136, no. 1, pp. 2061–2064, 2021.
[25] Q. Q. Zhang, B. Wang, H. S. Wang, and Z. J. Cao, “Chicken swarm optimization algorithm based on quantum behavior and its convergence analysis,” *Computer Simulation*, vol. 39, no. 1, pp. 327–332, 2022.