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*Retraction*

# Retracted: A Random Matrix Network Model for the Network Teaching System of College Music Education Courses

**Mathematical Problems in Engineering**

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1].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] X. He, "A Random Matrix Network Model for the Network Teaching System of College Music Education Courses," *Mathematical Problems in Engineering*, vol. 2022, Article ID 1827731, 11 pages, 2022.

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*Research Article*

# A Random Matrix Network Model for the Network Teaching System of College Music Education Courses

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How to improve the teaching management model has always been an important part of the research and exploration of university music teaching management. Based on the random matrix network theory, this paper builds a random matrix network model and uses the random matrix network of Internet/Intranet to realize the electronic and networked multimedia information management, which makes the data query more flexible and convenient. In the random matrix network environment, the security of the model network is greatly improved, which solves the expansion problem of the random matrix network. During the simulation process, the model integrates the relevant image, audio, video, animation, and other multimedia processing technologies and storage technologies. The system adopts object-oriented analysis and design ideas to analyze the requirements, adopts the random matrix network architecture, and uses tomcat as the server, and the SQL Server database launched by Microsoft is used as the backend data support, and the Struts architecture is designed by using the MVC development mode to ensure the system has good maintainability and enhanced data processing capabilities. The experimental results show that the response time of the system login verification is less than 2 seconds, the response time of adding users is less than 2 seconds, the response time of downloading assignments is less than 2 seconds, the response time of uploading courseware is less than 3 seconds, and the response time of checking the results is less than 2 seconds. The separation of technology effectively improves the scalability and maintainability of the system.

## 1. Introduction

With the development of information technology and computer network technology, the traditional music teaching model has been unable to meet the needs of modern teaching [1]. Music online teaching has been popularized and developed, and a new music teaching mode that is different from the traditional one and is not limited by time and place has been established. The new learning model is an important problem before us [2]. At present, many colleges and universities are still stuck in the traditional teaching mode of music teaching. In this music teaching mode, there is a lack of sufficient communication between teachers and students, teachers cannot timely and effectively grasp and understand students' understanding and mastery of classroom knowledge [3–5], and teaching efficiency and quality cannot be guaranteed. Therefore, building a music teaching control platform based on random matrix mode is an urgent need for network teaching [6].

The music education system in universities realizes the allocation of functional resources, which optimizes the resources of the university, and the efficient allocation and rational application of teachers, classrooms, courses, and time [7]. The problem of difficulty in arranging classes and summarizing grades under the state of high-level management is given [8–11]. Timely feedback of students' scores and teaching information ensures the rapid implementation of teaching management work and improves the office efficiency of teachers [12]. The credit-based teaching management model plays a very important role in university music and art colleges, realizing the benign interaction [13].

Starting from the system, according to the software development and project management theory, using the popular MVC design pattern and UML modeling language and using the random matrix architecture as the

development platform, a multilayer system based on random matrix is designed and implemented. The user login function of three identities of students, teachers, and system administrators is realized. The student subsystem can complete the management of students' personal information, browse relevant courseware information and other resource information, and download courseware and tutorials, and students can ask questions and carry out self-testing and other functions; the teacher management subsystem can upload and edit tutorial and courseware information, answer questions raised by students, and manage test questions and question banks; system administrators are mainly responsible for data backup and maintain and manage user personal information and permissions. The music teaching control platform introduced in this topic adopts a three-tier architecture system, which can effectively enhance the flexibility and expansibility of the system and also reduce the workload of later maintenance of the system. A set of data can be replicated to multiple mobile disconnected users, allowing those users to work autonomously. In addition, the use of this system will play a significant part in promoting school teaching reform, improving students' autonomy in learning and reducing teachers' workload.

## 2. Related Work

The application of music online courses in music education in normal colleges is not simply the network or digitization of traditional music courses, nor is it intended to replace traditional music teaching [14], but a beneficial supplement to traditional music teaching. Multimedia information data management technology is a data management technology, but the traditional relational database deals with character and numerical data, which is not suitable for expressing complex multimedia data such as images, sounds, and videos [15]. The current mainstream database system is based on the expansion of the original relational database and introduces a new binary large object (BLOB) data type to store multimedia object fields, but this proprietary data type will completely or partially sacrifice the availability of transplantation [16].

According to the requirements and analysis results of the random matrix system, Zhu et al. [17] carried out detailed design around the three major functional modules in the demand analysis, from the technical architecture design of the random system, the functional architecture design of the application system, the detailed function design of the system, and the design of the system database. From the point of view of control theory, Wang et al.'s [18] research on stochastic systems mainly includes modeling and identification (that is, establishing a mathematical model or estimating the parameters of the model based on measurement data), filtering (that is, estimating noise affected by noise based on measurement data and system model), performance analysis such as stability and observability, stochastic control (designing a controller for the system to minimize some specific performance indicators), stochastic adaptive control (combining system identification and control), and so on. In the requirement analysis and acquisition stage of the system, it is mainly to give an overall overview of the development of the system, clarify the development direction of the system, and then divide the system into three major functional modules according to the acquired requirements, clarify the role of each user, and provide a detailed understanding of the system. The design aspects of the research provide the corresponding basis. The wide application range of stochastic systems reflects the importance of research on the basic issues of control theory for stochastic systems.

When using random matrix theory to analyze problems, sometimes it is necessary to the influence of a single state variable on the whole. In this case, an augmented matrix construction method with increased weights can be used. Guerrero et al. [19] introduced and analyzed the feasibility of the music teaching system from the aspects of operational feasibility, economic feasibility, and technical feasibility. It mainly analyzes and designs the software system design. Xu et al. [20] first analyzed the design goals of the music teaching control platform and then decomposed its functional structure design; finally, they determined the design process of its database program [21]. Determine the implementation environment of the music teaching control platform, then show the flowchart of each module of the music teaching control platform, show the effect of the realization from an empirical point of view, and finally analyze the key codes [22–24].

## 3. Construction of the Random Matrix Network Model of the Network Teaching System of College Music Education Courses

*3.1. Random Matrix Solution.* In a random network, if the elements in the random matrix are all random variables $x$ defined in the probability space $y(x, t)$ and each element in the matrix belongs to the measurable space $s(x, t)$, it is called a random matrix. In simple terms, when the dimension $s(a, t)$ of the matrix tends to infinity, it is called a large-dimensional matrix. In addition, if the covariance matrices and $y(x)$ are identity matrices, they are called uncorrelated matrices; if only one covariance matrix $p(x)$ is an identity matrix, it is called a semi-correlated matrix; otherwise, it is called a fully correlated matrix.

$$\frac{y(x,t)}{h} = \frac{[s(ax), x(t), xt-1)]}{s(a,t) - s(x,t)},$$
$$y(x) - x = p(x < t-1) = p(x < t) - t - 1. \tag{1}$$

In fact, from a view of mathematical point $f(a, x)$, the other five can be regarded as non-centrally fully correlated random matrix arrays dia($t$). The gray level commonality matrix is used to realize the system retrieval. The gray level co-occurrence matrix is a way to describe this joint distribution. The construction of the image grayscale co-occurrence matrix is described in detail below. Starting from a pixel with grayscale $i$, another pixel with a distance of ($x$, $y$, d$y$) simultaneously has a grayscale of $j$, which defines the probability of these two grayscales occurring in the entire image. The Gaussian normalization method is a good normalization method, which is characterized by a small number of super

large or super small element values that have little effect on the entire normalized element value distribution.

$$f(a,x) - f\left(\text{dia}\left|x_i x_{k-1}\right|\right) = A(\text{sia}(x) - \text{dia}(t)),$$
$$H(x,t|x<t-1) = \sum_{x}^{n} SA(x) - SA(x-1). \tag{2}$$

The conceptual structure design is actually to determine the entities and attributes contained in the database $x(t, t-1)$, as well as the relationship between different entities, so as to obtain the system ER graph. There are three kinds of relationships between different entities: the first is a one-to-one relationship, that is, $1:t$; the second is a one-to-many relationship, that is, $t:n$; and the third is a many-to-many relationship, that is $x:n$. A support set (or simply support set) of a real-valued function defined on a set $X$ means that there exists a subset of $X$ over which $f$ happens to be non-zero.

$$\int H(x,t)x(t,t-1)\mathrm{d}x\mathrm{d}t = \frac{x(t-1)\mathrm{d}t}{1-t},$$
$$y(x,t) = \sqrt{x\frac{(t,t-1)}{(1-t)} - \frac{y(t,t-1)}{(1-t)}}. \tag{3}$$

There is a close connection between a distribution function and its Stieltjes transform. The algorithm is based on the latest update information. By introducing an adjustable parameter, the latest estimated information obtained in the current step and the estimated information in the previous step are weighted, which shows that the sequence converges; the necessary and sufficient conditions for its convergence are also given under the non-zero initial condition.

The participants in the homework management work include academic staff, music teachers, and music students. The platform in Figure 1 has functions such as data extraction and mining, OLAP, conversion and loading, and reporting. The following is the main realization idea of retrieving resources: in the system retrieval, the gray level commonality matrix is used to realize.

It also has an object model and corresponding application program interfaces in its various subsystems, so this data system can be applied in all business environments. Therefore, the auxiliary teaching management system designed and developed should have three types of user roles, the first type is the system administrator, the second type is the teacher, and the third type is the student. For any user, there can only be one user role, and different users can perform different operations through the system, and each operation is the embodiment of a function.

*3.2. Music Hierarchy Architecture.* The function of the item is to realize the management of the whole class, including dividing classes, adding classes, querying classes, and so on. These functional modules are interdependent and complete the management of all classes in the university. The query depth miu($x$) and breadth of music-level data

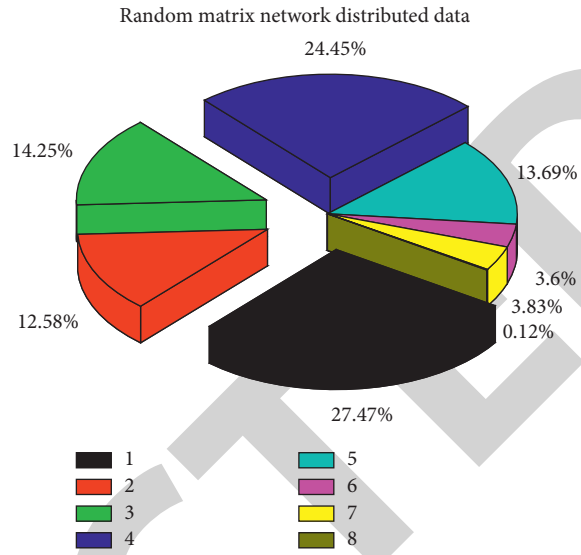


Figure 1: Random matrix network distribution data.

have been greatly improved, combining the processing and storage methods of non-standard formats. At the same time, there are many improvements in the design of the database $t[w]$ and the architecture of the system. The system adopts a four-tier architecture, display layer $p(w,x)$, business layer $w(x)$, data persistence layer $t[w-x]$, and data layer, so as to ensure that the system has a low degree of coupling. This provides a guarantee for system porting and re-upgrade. The database design is implemented by $e(x, t)$, which can achieve good control over database changes.

$$\text{miu}\left(x - \left|x_i x_{k-1}\right|\right) - \text{miu}\left(x - |x-t|^{1-t}\right) = e(x,t),$$
$$p(w,x|w(x)<1) = t[w] * t[w-1] - t[x] * t[w-x]. \tag{4}$$

An HTTP handler is a .NET component that implements the System.Web.HttpHandler interface. Any class that implements the IHttpHandler interface can be used to handle incoming HTTP requests. HTTP handlers are somewhat similar to extensions. The difference between HTTP handlers $p(x, y, z)$ and ISAPI extensions $p(x, y, z)$ is HTTP handler in the URL. In the retrieval of multimedia information resources, information such as file attributes is used to retrieve resources. Include the use of keywords, file types, file upload time ranges, file formats, and other aspects to retrieve resources and ensure the speed of retrieval and the accuracy of the retrieval process.

$$\begin{cases} p[x,z] + p[x,y] > e(x,y,z), \\ p(x,y,z) > p[y,z] + p[x,z], \end{cases}$$
$$\exp(x|x = 1,2,\ldots,t) = \int w(x)\mathrm{d}x - p[x] * p[x-1]\mathrm{d}x. \tag{5}$$

ASP.NET also supports extension $w(x)\mathrm{d}x$ of http handlers through the IHttpHandlerFactory interface. ASP.NET provides the ability to route http requests to objects $1-p$ of classes that implement the IHttpHandlerFactory interface $\mathrm{limp}(x)$ without providing the functionality of a concrete class $p$. For areas with coarse texture, the $P(i, j)$ values in the gray level co-occurrence matrix are more concentrated near the main diagonal because for coarse textures, pairs of pixels tend to have the same grayscale. For regions with fine texture, the $P(i, j)$ values in the grayscale co-occurrence matrix are scattered everywhere.

$$\lim_{i\longrightarrow\infty} p(|x-i|>e|xk-xi>0)\subseteq p(x<t-1),$$

$$\begin{cases} \dfrac{1+p}{1-q}-\dfrac{p}{1+q}-p=0, \\ \dfrac{1-p}{1-q}-\dfrac{p}{q}-q=0. \end{cases} \tag{6}$$

The advantage of this is that if the implementation method of the object $p(x-1)$ implementing the IHttpHandler interface $p(ax, ay)$ changes in the future, the client $1-n$ will not be affected. In the architecture of the multimedia information management system in universities, this paper adopts the current mainstream four-layer architecture.

For regions with fine texture, the $P(i, j)$ values in the grayscale co-occurrence matrix are scattered everywhere. Therefore, various statistics of the gray level co-occurrence matrix can be used as a measure of texture characteristics. Therefore, in order to facilitate future expansion and maintenance, the system adopts a four-layer architecture.

$$\begin{cases} |xt-xi|>p(x-1), \\ \lim\limits_{i\longrightarrow\infty} p(|x-xi|>0)=1, \\ \sum p(ax,ay,n)=\begin{cases} 1-ax-ay, ax>ay, \\ 1-n, ax<ay. \end{cases} \end{cases} \tag{7}$$

The main task of this module is to maintain the normal operation of the college music education and teaching system and the security settings of important data, including adding new users, modifying login passwords, and re-login. In addition, system management includes basic information management in education and teaching management, mainly including adding, modifying, deleting, and querying basic information such as departments, majors, and so on, which is the basic module used by system administrators. The department, class, and data dictionary information of the college music education teaching system are described.

The main user role of system management is the administrator of the system shown in Figure 2, which has the right to add, delete, and modify specific basic information. The system adopts unified identity authentication. When users log in to the system with different identities, they can only see the functions corresponding to the identities. The main window of the system provides users with five functions to choose from: class management, student file management, course management, and grade management.

*3.3. Network Teaching Data Flow.* The operation of network teaching data files is mainly realized through the FILEINFO class. In FILEINFO, there are methods, such as create, copy to , delete, and move to, to realize the creation, copying, moving, deleting, and other operations of files, and the FILEINFO class provides a lot of methods to get file attributes, such as existing name and so on. ASP-NET operates on folders mainly through the directoryinfo class, which has many of the same methods and properties as fileinfo. Many operations on folders are easily accomplished through directoryinfo. Also, it can use filestream class and GZIPstream class to realize the online compression and decompression function of the file in Figure 3.

Student file management function mainly realizes the management of personal information of university students, including the modification of personal information by students, the management of files by teachers in the academic affairs office, and the management of student status by teachers in the academic affairs office, so as to facilitate the university management department to quickly understand the basic situation of the school.

Because the physical meaning and value range of each component are different, they need to be internally normalized, so that each component can have the same weight when calculating the similarity distance. The integrated result is returned to the user's browser, and the user directly operates the feedback data for viewing, browsing, and processing.

The system adopts the multilayer architecture design mode of Figure 4. In order to reduce the load pressure on the server side, the system uses two servers, one of which is used as a dedicated database access server, and the other is used as a web deployment server. In the design of the system management class diagram structure, the system management interface class diagram object is provided, which includes different subordinate objects such as the user management interface class, the role management interface class, and the menu management interface class.

*3.4. Music Network Topology Architecture.* The multimedia management system mainly realizes the browsing of music network topology files, the retrieval of multimedia files, the statistics of multimedia files, the upload of multimedia files, the registration of users, the management of data, and the management of systems. That is, for a given reference to a base class (or interface), the consuming object has no way of knowing whether a derived class (or implementing class) exists. In order to utilize the information of the gray level direction, interval, and variation range of the image provided by the gray level co-occurrence matrix, the first-order and second-order statistics are calculated on the basis of the co-occurrence matrix as its texture features. Based on these numerical statistics, quantitative description and matching retrieval of texture features of images can be performed. So,

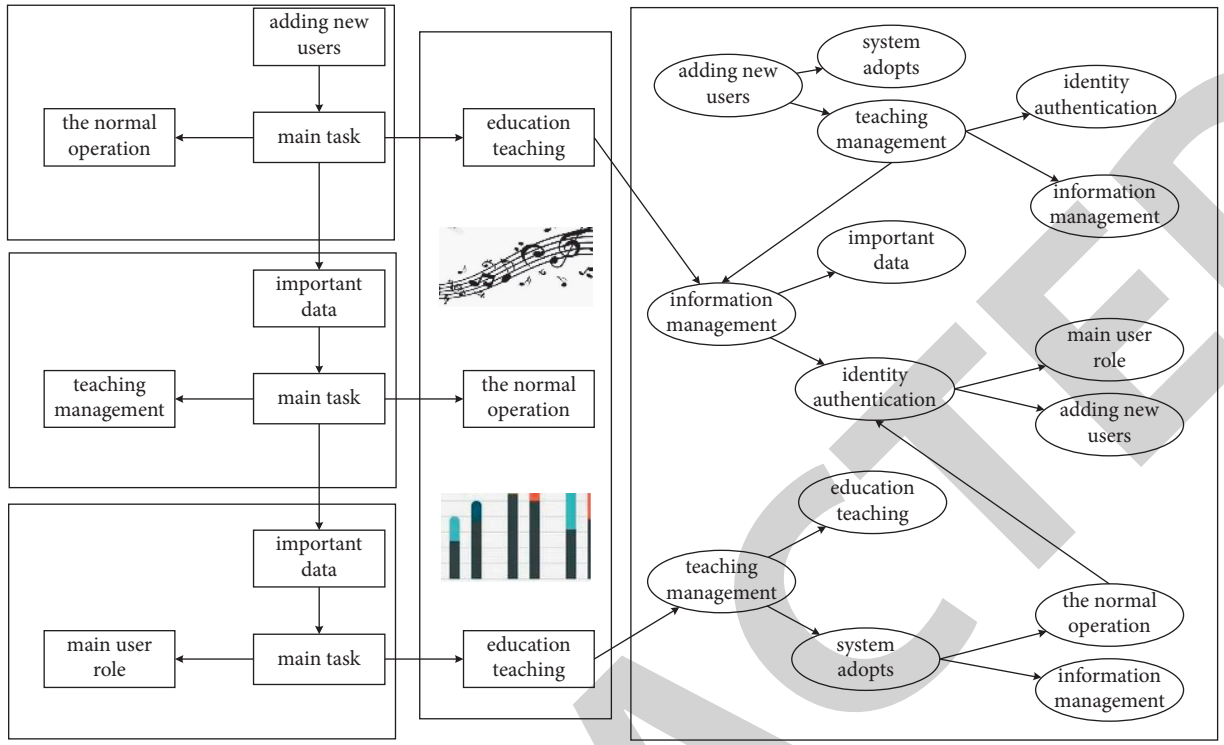


Figure 2: Music hierarchy architecture.

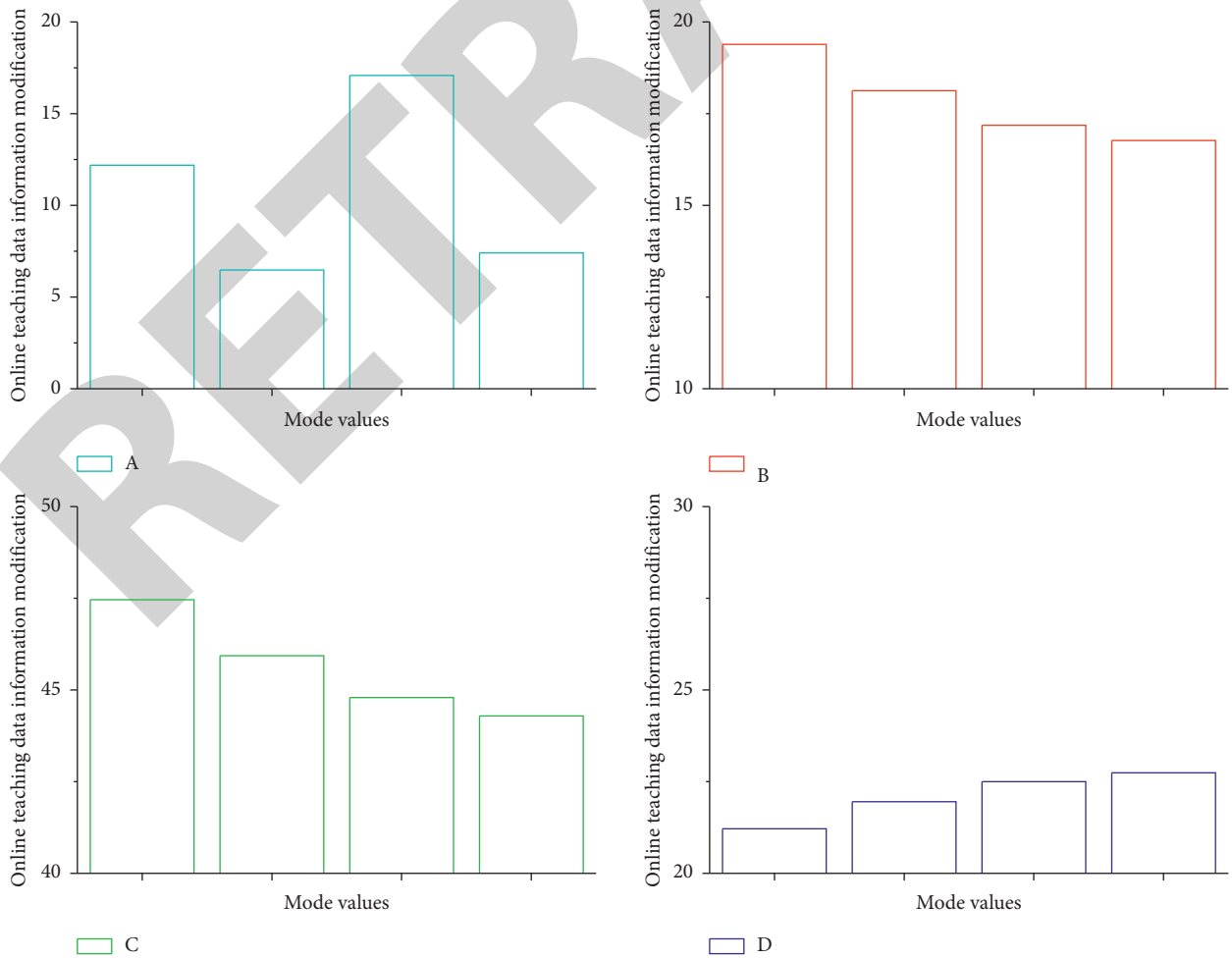


Figure 3: Modification of online teaching data information.

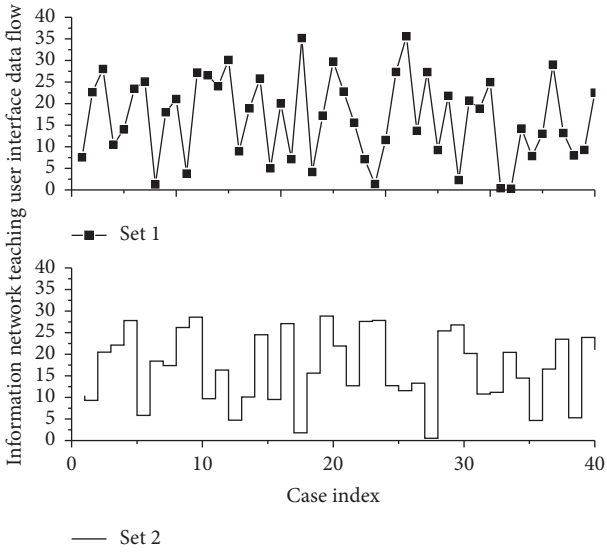


Figure 4: Data flow of network teaching user interface.

all these derived classes (or implementation classes) are interchangeable, thus encapsulating the type nicely.

When the mode of the system tends to infinity, the calculation of the performance index of the system in Figure 5 is simplified, thus reducing the computational complexity; the method of asymptotic analysis makes the calculation of the performance index no longer depend on the specific channel matrix. Specifically, in most cases, the asymptotic analysis method based on stochastic theory guarantees that the empirical singular value distribution of the channel matrix H has the following important characteristics that are very convenient for analyzing wireless channels when satisfied.

The Gaussian normalization method is a better normalization method, which is characterized by a small number of super large or super small element values that have little effect on the distribution of the entire normalized element value. The purpose of this design is to better communicate with the front and back offices.

*3.5. Module Feasibility Analysis.* The course management module sets the courses of each class in the university. The course management module can set the selection of teaching materials for each course of music and art teaching, which facilitates the work of the teaching management personnel of the teaching materials management department and the academic affairs office of the university. This module includes functions such as curriculum development, initialization of classroom resources, and class selection. During the course information query process, select the course information to be deleted in the course list and send a deletion request. The system receives the primary key of the course to be deleted and prompts the deletion result according to whether the operation is successful. This development mode greatly reduces the load on the client computer programmatically and at the same time reduces the tasks and costs caused by the later maintenance and upgrade of the system. With this mode, users can enter and modify their own information so that other authorized persons can easily view and share the various information shown in Figure 6.

In the process of uploading multimedia data, AJAX is widely used. When selecting a file, the system will asynchronously obtain the attributes of the file and other related attributes, so that some search information can be accurately counted in the background without user participation, which can not only improve the information but also improve the efficiency of adding information and the user experience.

Here, one person is set as the system administrator, and the information technology teacher is the teacher. Because the information technology teacher is familiar with the use of the database system and the teaching structure, it is the most suitable. If these two controls are used alone, it cannot be achieved. This is a bug of VS. In this way, the only way to change the code of the AJAX control is to make it compatible with the file upload control.

## 4. Application and Analysis of the Random Matrix Network Model of the Network Teaching System of College Music Education Courses

*4.1. Music Data Preprocessing.* Music data design adopts the three-level management mechanism of resources, roles, and users, flexibly assigns roles to users, and assigns accessible resources to roles, so that the permissions of users can be configured. The roles used by the system are stored in the role table. For example, in the multimedia information management system of colleges and universities, the users of the system include system developers, school administrators, teachers, students, learning media teachers, and so on, and each has its own authority. These approximate expressions are usually relatively simple and can lead to corresponding conclusions for the characteristic parameters of most interest in Figure 7.

After the user is registered, if the user information changes, such as the user's contact information, the department to which the user belongs, and the user's responsibilities and permissions, the administrator or user with the user's modification authority can be allowed to modify the user information. First, the administrator logs in to the background of the system, selects user management, retrieves the users who need to update the information, modifies the relevant information, and then confirms to save. Among them, the most core function is the course resource management function.

By implementing predetermined test plans and test steps, it is determined whether the characteristics of the university multimedia information management system meet the requirements; all documents are correct and easy to use. In the music teaching auxiliary platform, administrators (including teachers) can manage and publish courses, and administrators also need to conduct corresponding audits on registered student users in a timely manner. In addition,

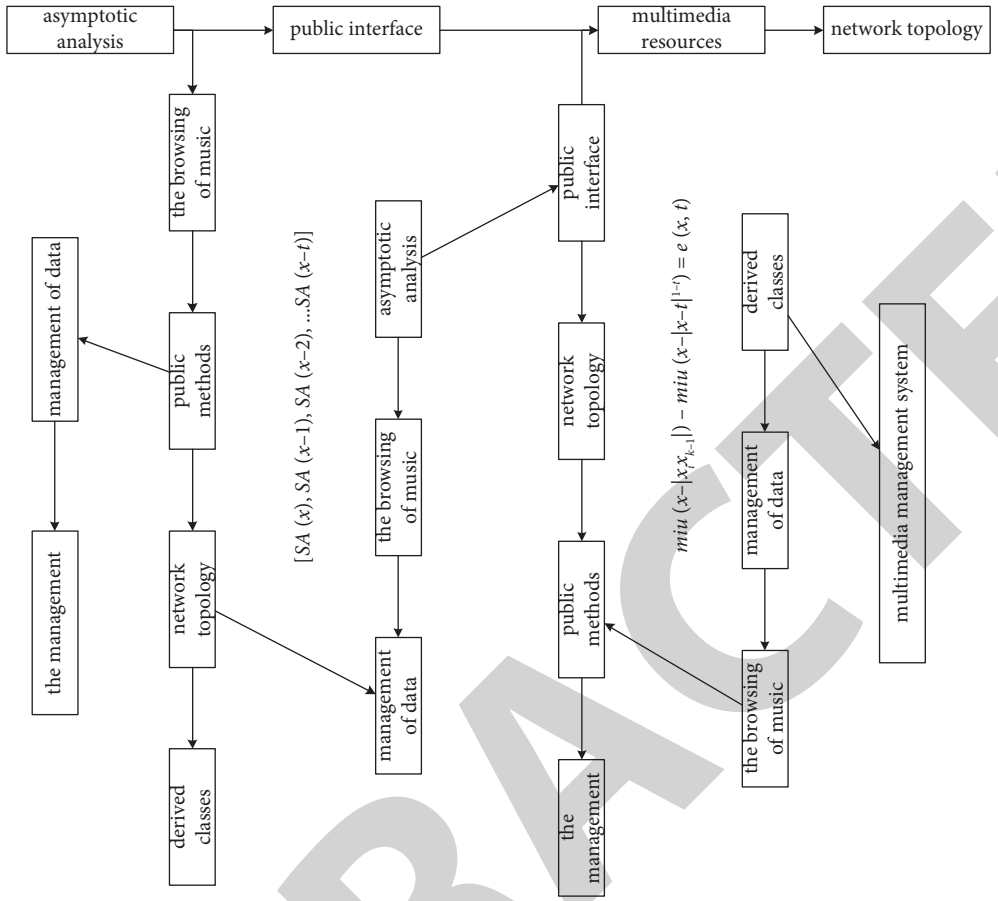


Figure 5: Music network topology.

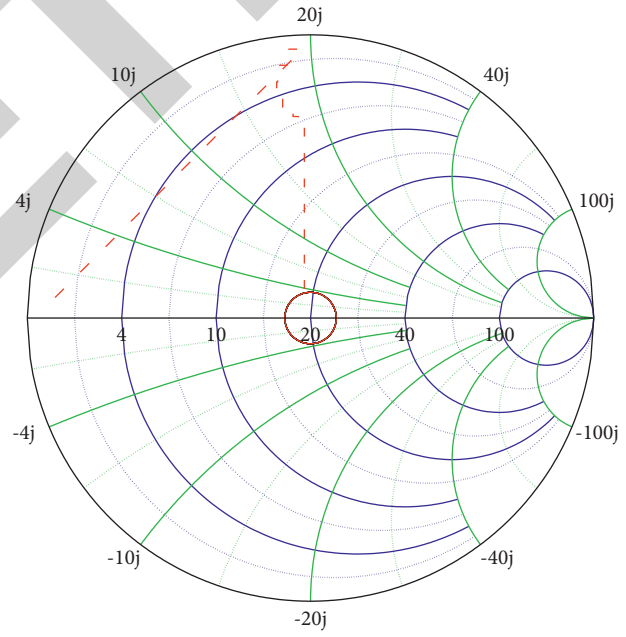


Figure 6: Feasibility of random matrix network module.

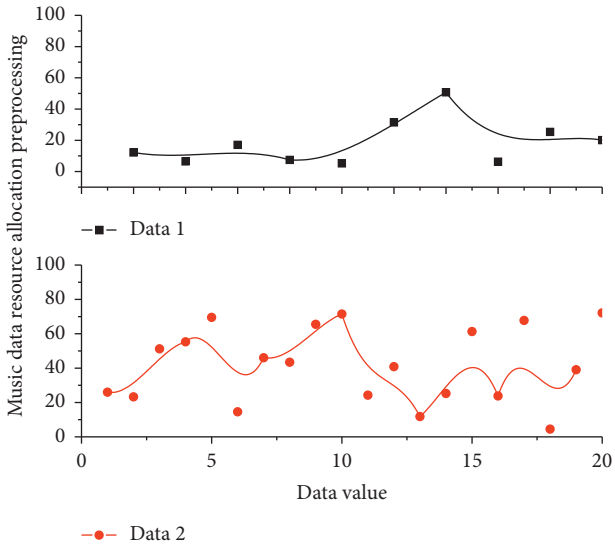


Figure 7: Music data resource allocation preprocessing.

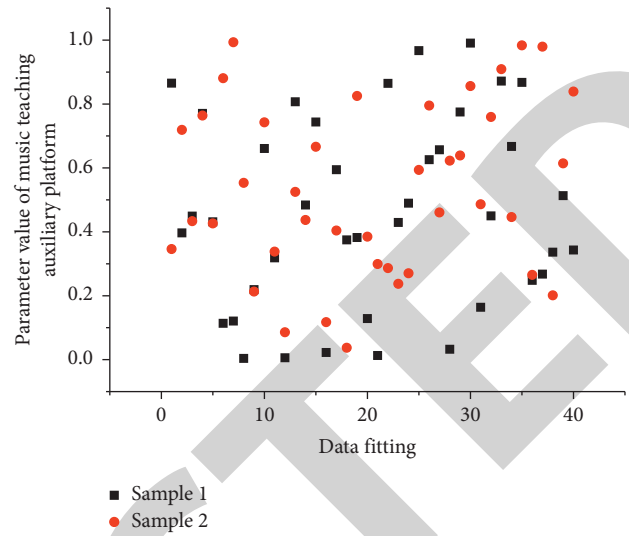


Figure 8: Parameter fitting of music teaching assistant platform.

the communication platform is an important module to help students learn independently, which enables students and teachers to communicate, answer questions, and discuss activities.

To some extent, the use case of Figure 8 is described from the perspective of a user who tells the system what to do. It has basic operation functions such as information retrieval, statistics, management, and maintenance for authorized users, mainly responsible for students, teachers, course information, entry, modification, and deletion of courses in each semester; at the beginning of the semester, students can choose courses according to the course arrangement, and teachers and students can make inquiries according to different conditions.

*4.2. Network Simulation of Educational Courses.* The management object of the music system in universities is single, and they are all students and teachers. According to the characteristics of the users of the system, the design of the music education and teaching system in universities adopts the framework development mode of JSP technology, random matrix and C/S combination, JDBC connection database, and Struts technology implementation. The C/S structure is used for the course arrangement management part of the music education and teaching system in universities, which has relatively centralized management and complex interaction; the relatively mature and stable open-source MVC framework Struts separates display, control, and business logic, improving the maintainability and scalability of the music education and teaching system in universities.

In this management system, the system administrator has the greatest authority. The system information includes the user management part. Since there are many modules in the multimedia information management system in universities, a single test is definitely not feasible. This paper uses $N$ unit software to test. The following explains how to use it to test the modules of the multimedia information management system in universities.

Table 1: Education course network settings.

| Education ID | Course type | Network cases | Network ratio |
|---|---|---|---|
| Inputdate | Char | 76 | 0.19 |
| Inputwork | Boolean | 10 | 0.32 |
| Inputtime | Int | 48 | 0.35 |
| Path | Int | 42 | 0.64 |
| Outputtime | Int | 62 | 0.56 |
| Outputwork | Boolean | 59 | 0.30 |
| Outputdate | Char | 95 | 0.41 |

The data flow in Table 1 is a form of expressing the work of the data processing system through the two aspects of data and data processing. This description can be more easily understood by designers, developers, and users. Struts is a framework technology based on the MVC pattern. Struts ActionServlet controls the navigation flow. It is a web-tier application framework that is highly configurable and has an ever-growing list of features. In the design process of functional modules, four different functional modules are designed according to three different user roles and their functional requirements. In the aspect of database design in Figure 9, it mainly starts from the two aspects of logical structure and physical structure design.

The classes that complete the management functions of student files in student file management include the student file management control class StudentsArchivesAction, the student file management business logic class StudentsArchivesService, the student file management entity class StudentsArchivesBean, the student file management form class StudentsArchivesForm, and the database connection class ConnDS. The student file management control class StudentsArchivesAction mainly includes the definition of methods in student file management, such as adding file method executeAddFiles0, managing student status managementStatus0, managing basic information method

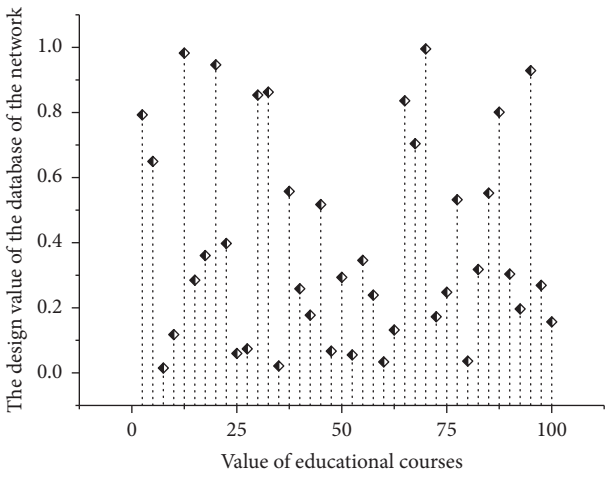


Figure 9: Design of network database for educational courses.

managementBasiclnformation0, deleting file method executeDeleteFiles0, querying file method executeCheckFiles0, and modifying file method executeUpdateFiles0.

*4.3. Example Application and Analysis.* Course management is an indispensable functional module in the music teaching and education management system in universities. The main functions involved in the core functional modules will be implemented through the class management control class ClassAction, the class management business logic class ClassService, the class management form class ClassForm, and the class management entity class. After the user enters the new class data, the request is sent by submitting, the class management control class ClassAction calls the class management business logic class ClassService to add the class method, the parameters in the class management form class ClassForm are encapsulated with the class management entity class ClassBean, and the statement is added through the new class in Table 2.

The student file management control class in the system receives the student status data in the form and determines whether the same record exists in the database. The system class control class receives user query conditions and queries the database for corresponding class information. After the query, it is judged whether there is a corresponding record, and the page displays the class query result.

The main classes in the achievement management include the achievement management control class ResultAction, the achievement management business logic class ResultService, the achievement management entity class ResultBean, the achievement management form class ResultForm, and the database connection class ConnDS. The grade management control class CourseAction defines a number of grade management related methods, such as the method for setting the test type setExamType0, the method for checking grades checkGrades0, the method for initializing transcripts, initializationTranscript, and the method for summarizing grades, summaryResults, and so on. When the system is used by 200 users at the same time, the server CPU usage is less than 65%, the memory usage is less than 60%, the login

Table 2: Music teaching authority management mechanism.

| Management mechanism codes | Music teaching authority words |
|---|---|
| Trainingset = [] | Reliability of the system |
| Testset = [] | In actual operation $w(x)dx$ |
| Split = 1/3 | Add to the database $(1-t)$ |
| Loaddataset(r'e:\pycharmcode\irisdata.txt') Print('train set: '+ repr(len(trainingset))) | The result returns to $f(i-1)$ Selects two testing methods |
| Print('test set: ' + repr(len(testset))) | After the new class is added |
| Result = getresponse(neighbors) | $1-ax-ay$ of system testing |
| Predictions.append(result) | To complete $x_i x_{k-1}$ |
| Accuracy = getaccuracy(testset, predictions) | $x-\lvert x-t\rvert$ is to verify |
| Print('accuracy: ' + repr(accuracy) + '%') | The system testing $x<t-1$ |

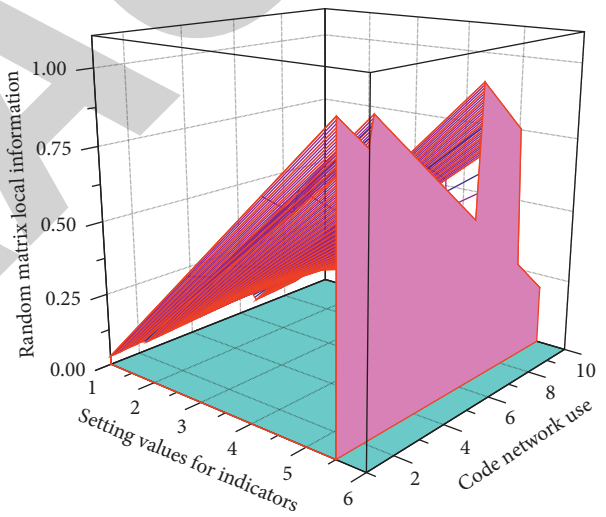


Figure 10: Random matrix network graphics user settings.

verification response time is less than 2 seconds, the response time for adding users is less than 2 seconds, the download job response time is less than 2 seconds, the response time for uploading courseware is less than 3 seconds, and the response time for viewing results is less than 2 seconds.

The experiment uses LoadRunner to simulate the scenarios of 200 users online and 300 users at the same time through the simulator (Figure 10). When adding a new student status, after the clerk fills in the new student status, the page will use JavaScript to verify the page form data. After the student status information is in the correct format, a new request will be sent. The student file management control class of the system receives the student status data in the form and determines whether the same record exists in the database. If there is, it needs to be filled in again; otherwise, the corresponding data in the form are saved to the data, and the result of the operation result of adding student

status information returns the value display page, and it is closed to add request for student status information. The information does not match and needs to be filled in again, bringing a better user experience to teachers or students. Operating permissions are set, and the corresponding permissions can only view or download multimedia resources of the corresponding level. Because the physical meaning and value range of each component are different, they need to be internally normalized, so that each component can have the same weight when calculating the similarity distance. Various types of information can be added, modified, deleted, etc., so that specific functions can be implemented in one window, simplifying the system and making user operations more convenient.

## 5. Conclusion

In the development process of this paper, the random matrix technology is applied to the management of music education. Based on the hierarchical structure of random matrix network, the informatization of music education and teaching management is realized, which has a positive significance for the construction of university informatization. This system uses the principle of software engineering and completes the management system of music education and teaching through the analysis of random matrix system requirements, system design and detailed design, and system testing. The random matrix-assisted teaching management system is divided into three types of user roles, and the system administrator is mainly responsible for managing basic information; for teachers, its functions include personal information management, courseware management, homework management, homework review, and grade management; for students, its functions include personal information management, courseware management, homework management, and grade query. It is a relatively scientific approach to let users register, which allows the administrator to easily collect some information and make some accurate judgments on the application of the system, but it is necessary to improve the user registration process. The development process of the music education teaching management system is carried out in strict accordance with the steps, and in the whole process of system research, analysis, and design of the system, it strives to be scientific and rational. The teaching management function implemented in the random matrix system has a friendly interface, relatively complete functions, convenient and quick use, and is safe and efficient.

## Data Availability

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

## Conflicts of Interest

The author declares that there are no conflicts of interest.

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