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Research Article

Teaching Management System and Algorithm Implementation Based on Big Data Fuzzy K-Means Clustering

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In this paper, the clustering algorithm of big data fuzzy K-means is used to research and analyze the teaching management system. Since the values of the indicator variables of bad units are usually significantly different in smooth areas and discontinuous areas, we cluster the indicators of local areas through K-means clustering, so that only good units or bad units are included in each class. The server is deployed on the campus and is networked with the teaching computers of each classroom. Teachers log in to the class rate management system before or during class, log in to their respective users, select the corresponding class, and make corresponding attendance records according to the attendance of students in the class. The system automatically counts the number of expected arrivals, attendance, late arrivals, leave requests, and absenteeism for the class. Teachers can also fill in information feedback for this class: a list of absenteeism, classroom discipline, student learning status, teaching suggestions, and teaching testimonials. The development environment built by this system is a combination of PHP + MYSQL, which reasonably planned according to the overall needs. The development mode adopts the top-down model, which runs through the whole process from system development to testing to application. The most used floating point number encoding is the decimal floating point number encoding. The relationship of each module of the virtual reality teaching management system is sorted out, the overall framework of the virtual reality teaching management system is established, and the design of the business flow diagram of the management system is completed. This paper also uses Oracle database technology to further explain the design process of designing the system database. Finally, combined with the system design and implementation, the system test is completed from two aspects: system function test and performance test.

1. Introduction

Scope management is the basic work of project management and runs through the whole process of the project. In a good engineering project, the project schedule, cost, and quality are based on good scope management [1]. At present, there is little research on scope management under the model of "university + software company," which is a model of two parties' participation and close cooperation. For the development of ordinary software system projects, party A is usually in a natural and strong position in business cooperation, while the university teaching system has certain barriers due to its specificity. There are few university teaching management system development companies in the market. There is a certain monopoly, so the relationship between software companies and colleges and universities is in a delicate state. Differences in the degree of control of the scope management initiative between the A and B parties and the inconsistency of understanding of the various processes of scope management may cause work confusion. The scope management stage is the key stage of engineering project management [2]. It plays a key role in the entire life cycle of the entire engineering project construction and has a guiding role in the subsequent construction of the entire engineering project. The scientific and orderly construction of the teaching management system project is of great significance, so it is necessary to put forward constructive opinions and suggestions on the management of each stage of the teaching management system project in colleges and universities,

especially the research on the scope management [3]. At present, the teaching management system is still in the process of gradual standardization and rapid development. In recent years, with the development of hardware technology, the traditional teaching management system has adopted the combination of software and hardware to improve the teaching management work.

The teaching management of a college is closely related to the management of teaching planning, management of teaching quality, management of teaching organization, and other basic links, and it is also necessary for management in school management. Teaching management refers to the management of teaching. With the help of certain management methods and means, the teaching activities can achieve the set teaching objectives, that is, personnel training, and a normal teaching order is an important guarantee for teaching management. It can have good search ability in multidimensional space, is convenient to deal with the global optimization problem of multiextremum function, can reduce the difficulty of operation, and can effectively improve the operation efficiency of the algorithm. A satisfaction survey on the students to the teachers adopts the form of paper manuscripts. This method has disadvantages: the statistics are cumbersome, the data transmission is inconvenient, and the efficiency is low. To achieve a mutual evaluation of teaching and improve work efficiency, the teaching evaluation module of this system provides two functions student evaluation of teachers and teacher evaluation of classes to realize a two-way evaluation system [4]. Automatically calculate the scores and comments of the students in the class on a teacher's evaluation.

To sum up, design-based learning is a new type of learning method, mainly focusing on design-based tasks, emphasizing the process of inquiry, investigation, and repeated design. This study defines design-based learning as thematic task-centered learning activities carried out around certain goals, and students promote the completion of tasks by integrating and applying knowledge, skills, and methods in different fields. To put it simply, virtual reality classrooms are like traditional multimedia classrooms in that they are composed of servers, teachers' computers, students' computers, and corresponding network infrastructure. The difference is that based on traditional multimedia classrooms, each student computer in the virtual reality classroom will be additionally equipped with a PCVIVE virtual reality headset. The virtual reality teaching management system is used to drive virtual reality classrooms. Based on some functions of the traditional multimedia classroom management system, an immersive and interactive virtual reality teaching experience added to support scene-based virtual reality teaching. During the entire university study period, the university tracks and evaluates the overall learning performance of each student, and through quantitative and quantitative analysis of students' academic performance and ability to solve practical problems, to ensure that students can meet the school's graduation requirements when they graduate.

2. Related Works

The functions supported by these products are limited. They only support preinstalled virtual reality content and do not support the dynamic addition of new content [5]. Also, like Google Expedition, students can only browse virtual reality content. Switch between contents and cannot interact deeply with the contents, such as answering questions [6]. In addition, these systems fail to solve the problem of third-view mixed reality demonstration teaching, which greatly reduces the effect of virtual reality teaching. Considering that the virtual reality teaching management system based on PC VIVE has many similarities with the traditional multimedia classroom teaching management system, the following mainly introduces the research status of the traditional multimedia classroom teaching management system [7]. Wu and others applied desktop virtualization technology to multimedia classroom management, built a flexible and flexible management structure, and improved the level of intelligent management [8]. However, the initial construction cost is high and the network bandwidth requirements are high. In addition, because the courseware used in the virtual reality teaching process needs to consume a lot of GPU computing resources, the running process of the courseware can only be completed by the local high-performance host, and the desktop virtualization technology cannot be applied [9]. Tian and Zhang proposed that the use of pure B/S structure for design and development can effectively solve this problem [10]. However, after adopting the B/S structure, the user can only enter the system through the browser, which is inconvenient to use. Moreover, due to the security restrictions of the browser, the system cannot access the hardware resources of the device and cannot realize advanced control functions.

Jamel and Akay suggested that in the process of project scope definition, the deliverables need to be decomposed, and the work should be decomposed into small definable or quantifiable work packages based on the deliverables [11]. Jalali et al. use the Project Definition Rating Index (PDRI) to define the scope of the project [12]. The main method is to predict and analyze various uncertainties and factors in the project and to stratify the index. To a certain extent, this method can provide help for project factor decomposition and factor hierarchy ranking. With the improvement of the degree of informatization in colleges and universities, the characteristics of high-speed data generation are becoming increasingly obvious [13]. The main method is the connection between the load balancing server and the gatekeeper isolation area, to control the database server and application server in this area. For example, the number of clicks of an online open course can be as few as tens of thousands of times every year, and it can reach as many as millions of times. It will collect a large amount of detailed and accurate learning behavior data of learners in real time, including login time, IP address, video content, learning time, pause or skip, online test accuracy, time to answer each question, number and content of posts, and time to answer questions and content. All this information needs to be processed quickly while being generated quickly.

Hidayat et al. proposed to combine the two algorithms of genetic and K-means, to give full play to the global optimization ability of the genetic algorithm and the fast convergence characteristics of the K-means algorithm, and to effectively improve the defects of the K-means algorithm [14]. According to the hierarchical structure in space, Vankayalapati et al. proposed a method of improving the hierarchical K-means clustering tree, which can automatically select the number of clusters to obtain a better clustering effect [15]. In this paper, some improvements have been made to the basic genetic algorithm, mainly to optimize the fitness function in the genetic algorithm. The optimized algorithm is used for cluster analysis, and the algorithm is applied to the undergraduate engineering quality certification for data analysis.

3. Big Data Fuzzy K-Means Clustering Teaching Management System

3.1. Analysis of Big Data Fuzzy K-Means Clustering Algorithm. The classification itself is not a new thing. In the early era of human civilization, people have begun to use their own and predecessors' experiences to classify things, such as the distinction between animal species and the distinction between plant species. They are all distinguished according to some unique characteristics of the thing itself and the experience summed up by predecessors. Teaching management means that teaching managers use certain management methods and means to make teaching activities achieve the set teaching goals, that is, talent training, and a normal teaching order is an important guarantee for teaching management. With the progress of human civilization and the rapid development of science and technology, many new things have been produced, and people have discovered some unknown areas. Therefore, the task of data processing and analysis is getting heavier and heavier, and the requirements and standards for data classification are becoming increasingly demanding. The data analysis results used in increased scenarios, and the classification methods relying on previous experience and professional knowledge are difficult to adapt to the current classification needs. Therefore, scholars and experts apply knowledge such as mathematics and statistics to classification problems [16]. In short, clustering is when all abstract objects or data objects in the same set have similar characteristics in some aspects, so the data set generated by clustering is often to make the similarity of sample data in the same set as large as possible. In other words, the sum of the distances in all dimensions between them is as small as possible; on the contrary, the dissimilarity of the data objects between the two sets is as large as possible or the distance in dimensions is as far as possible.

Given a sample dataset X_n, the sample set contains n data objects, and each data object has m characteristic attributes, $[x_1^2, x_2^2, x_3^2, \ldots, x_i^2]$ represents i-th A data object, $[x_1^2, x_2^2, x_3^2, \ldots, x_n^2]^T$ represents the value of n data objects in feature j, so the representation of the data set is as follows:

$$T = \begin{bmatrix} x_{11}^2 & x_{12}^2 & \ldots & x_{1m}^2 \\ x_{21}^2 & x_{22}^2 & \ldots & x_{2m}^2 \\ \ldots & \ldots & \ldots & \ldots \\ x_{n1}^2 & x_{n2}^2 & \ldots & x_{nm}^2 \end{bmatrix}. \tag{1}$$

The collected data often have different measurement units. In this case, it is complicated to analyze the sample data. Therefore, the data set that needs to be processed should be standardized. When clustering sample data, the similarity of two data objects is usually measured by the sum of the distances between two data objects in all dimensions. So, the data object the smaller the distance $d(i, j)$ between i and the data object, the closer i and j are; conversely, the greater the distance between the two objects. The data layer defines the data entities contained in the system, the view layer defines the user interface display mode of the system, and the business layer is used to process the business logic of updating data or views.

$$d(x, y) = \sqrt{x_1^2 + y_1^2 + x_2^2 + y_2^2 + x_3^2 + y_3^2 + \ldots + x_i^2 + y_i^2}. \tag{2}$$

Since some sample data are complex and numerous, the hierarchical method is to decompose the sample data layer by layer according to a specific hierarchical structure and decompose the goal of clustering into multiple small targets that can be processed. Hierarchical methods are divided into bottom-up agglomeration methods and self-directed splitting methods. The agglomeration method is to treat each data object as a class and then judge whether it can be merged into a class according to a certain condition set and if so, merge until all data are merged into a class or it ends when the termination condition is reached, as shown in Figure 1.

Clustering is one of the most important methods in data mining technology. It characterized by easy algorithm implementation and simple programming, so it is widely used in life and work and is often used as a data preprocessing operation in other data mining methods. It can also be used in conjunction with other algorithms at the same time. Therefore, it is usually necessary to make various improvements to the clustering analysis method according to different problems and needs. In the genetic algorithm, the actual problem to be solved first needs to be encoded. Answer management supports functions such as creating test questions and setting test duration, distributing test questions to students, and visual feedback of test results. The encoding method will not only affect the operation of the genetic operator but also affect its convergence speed and accuracy. Therefore, the encoding method is important in the genetic algorithm [17].

$$K = \begin{cases} u_t - \Delta f(u) = 1, \\ u(x, 0) = u_0(x). \end{cases} \tag{3}$$

Bad cell indicators usually have a bad cell indicator variable that behaves differently in smooth and discontinuous regions. Therefore, the bad cell indicator can identify discontinuous cells when the indicator variable exceeds a

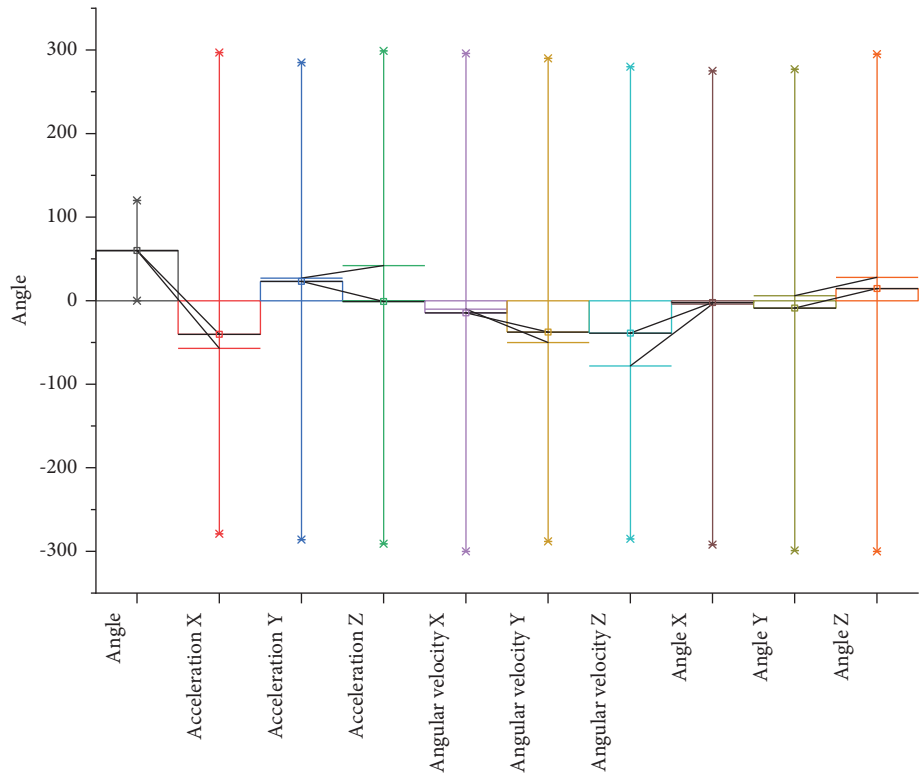

Figure 1: Self-organizing map neural network structure diagram.

certain threshold. However, this threshold usually depends on the solving problem itself, and it is difficult to find the optimal value, which brings great inconvenience to numerical simulation. The new bad cell indicator based on K-means clustering studied in this paper collects the value of the cell indicator variable as a data set, applies the statistical data analysis method to judge the bad cell, and compares it with the classical one. The KXRCF bad cell indicator is compared. The definition of the KXRCF bad cell indicator is as follows:

$$\frac{\left|\int_{\partial k}^{\partial m} |\eta| k - \eta|| \mathrm{d}s\right|}{h_K^2 |\partial K| \|\eta K\|} \leq \theta. \tag{4}$$

To simplify the description of the novel bad cell indicator, we assume that the indicator variable is nonnegative and has a larger value at the bad cell. Many indicator variables have these characteristics. For other indicator variables, we can similarly design new bad cell indicators. Finally, we need a criterion to determine whether a template falls into Category I or Category II. Bad cells can be easily detected if we know which category the template belongs to. If the template is in category I, there are no bad cells.

$$\frac{a_L^i}{a_S^j - \zeta^2} > \beta. \tag{5}$$

When dealing with large data sets, binary encoding often cannot achieve good encoding effects, so experts and scholars have proposed a new encoding method, floating-point encoding, sometimes called truth encoding. The most used floating point number encoding is the decimal floating point number encoding [9]. The data analysis results are used in increased scenarios, and the classification methods relying on previous experience and professional knowledge are difficult to adapt to the current classification needs. It can have good search ability in multidimensional space, is convenient to deal with the global optimization problem of multiextremum function, can reduce the difficulty of operation, and can effectively improve the operation efficiency of the algorithm. During the teaching process, teachers can view the pictures on the students' headsets and give voice guidance.

The initial population is generated based on prior knowledge. The condition of this method is generally to guide some prior knowledge in advance and randomly select the solutions that meet the conditions of the initial population species, as shown in Figure 2. Using this method, we can speed up the genetic algorithm to search for the optimal solution. Servers and application servers are managed and controlled.

Because the subjects of teaching evaluation are usually different individuals from different groups, their evaluation scales are different when evaluating teaching [18]. To eliminate the influence of these factors as much as possible, it is necessary to standardize the data and merge and restore the standardized data.

Therefore, there are currently many software packages for determining K, such as the McCluster package, the user can input the upper limit of the desired clustering family. The system performs many calculations according to distance, density, and other methods and finally determines an

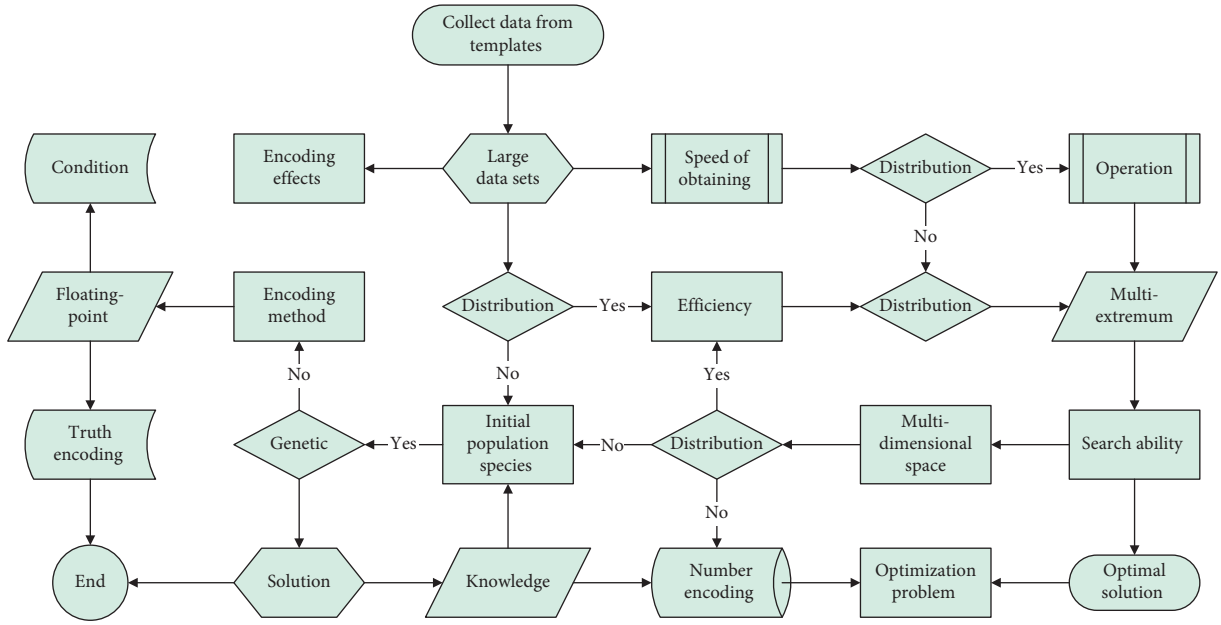

Figure 2: Algorithm flowchart.

optimal number of clusters. However, for some problems, it cannot be calculated, and the efficiency is low. The server, teacher computer, and student computer all contain a system authorization module. Another example is The NBC lust package, whose idea is like the McCluster package, which defines multiple evaluation indicators, performs multiple traversals, and finally selects the cluster with the largest number of indicators supported.

3.2. Design of Teaching Management System. Because there are many messages pushed in the system, technologies such as WebSocket need to be used. For the server in the system, if Java used for development, such as using Spring and other common server development frameworks, there is no native WebSocket support, it needs to be extended using the STOMP protocol, which will introduce additional performance overhead and increase the complexity of system development [19]. Therefore, in the technical selection of the system, the server-side also uses Web technology for development, uses Node.js to build server-side applications, and uses express as the server-side framework to avoid the above problems.

The whole teaching management system divided into three parts: classroom server, teacher computer management system, and student computer management system. According to the idea of "high cohesion and low coupling," the level division of the server, teacher computer, and student computer are consistent, and the three parts use the classic internal MVC three-tier architecture. This threshold usually depends on the solving problem itself, and it is difficult to find the optimal value, which brings great inconvenience to numerical simulation. As shown in the system architecture diagram in Figure 3, the three parts of the entire system are divided into three layers: data layer, presentation layer, and business layer, which improves modularity, ease of use, and reusability, making the entire system more flexible. The data layer defines the data entities contained in the system, the view layer defines the user interface display mode of the system, and the business layer is used to process the business logic of updating data or views.

The teacher computer and the student computer belong to the client-side application programs, which are mainly based on user interaction and network communication, and can adopt the same design scheme and technology stack, which is conducive to reducing the complexity of development and maintenance and enhancing the value of module reuse. Both the teacher's computer and the student's computer are developed based on Electron using React and related Web technologies. The teacher's computer is mainly based on the display function and provides teachers with a wealth of management functions, including courseware management, answering management, monitoring and demonstration teaching, and other functions. Courseware management includes viewing the downloaded courseware information and the scene information contained in the courseware, as well as scene control including opening, switching, and closing scenes. Answer management supports functions such as creating test questions and setting test duration, distributing test questions to students, and visual feedback on test results [20]. During the teaching process, teachers can view the pictures on the students' headsets and give voice guidance. The system authorization module in the server records the information of all legal devices in the classroom and rejects the access request of unauthorized devices.

In addition, teachers can also bring virtual reality headsets, and through the demonstration teaching function, the virtual scenes in the teachers' headsets can be integrated with the real environment of the teachers, and output to the screen to demonstrate to the students. The student computer

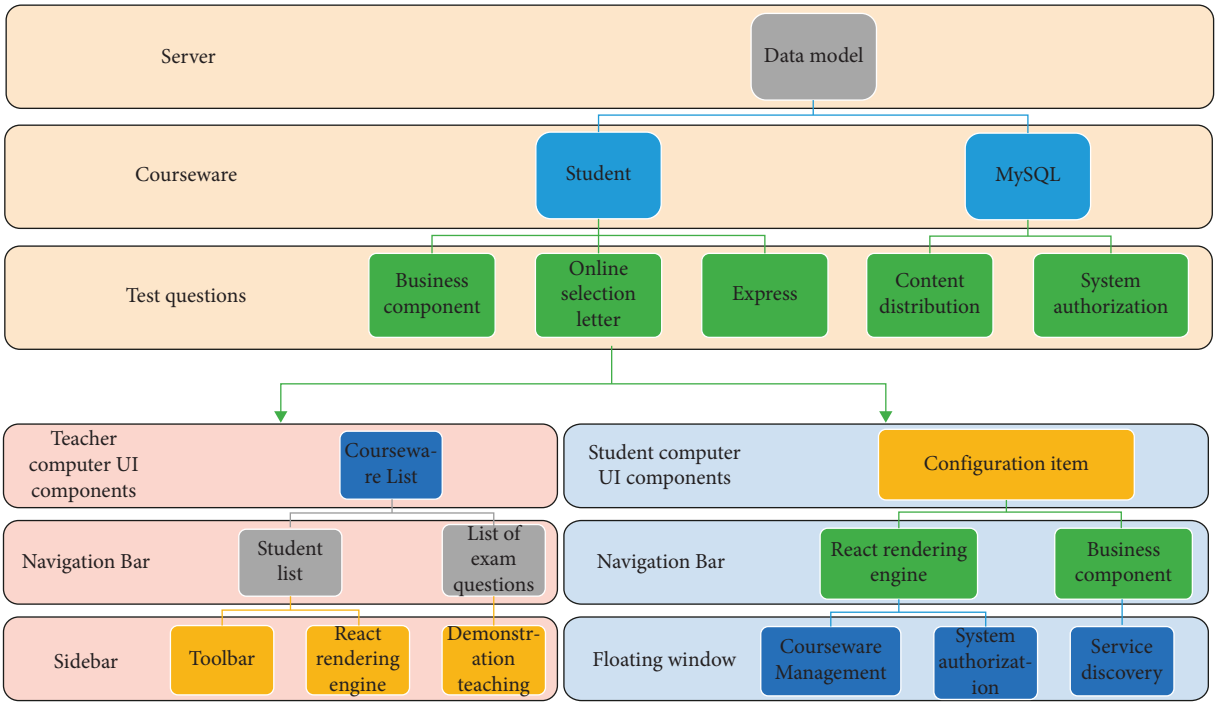

Figure 3: System architecture diagram.

is mainly used to download the courseware content from the server and process various messages from the server. In the teaching process, the student terminal carries the communication with the courseware content, including the functions of courseware management and answer management, and carries the audio and video communication with the teacher's computer.

Before the system can go live, it needs to be deployed in classrooms. The deployment process is done by professionals within the company responsible for implementation. The deployment process is mainly to configure the student computer, including the number of the seat and the address of the local courseware. At this time, the configuration item component is called to complete the relevant configuration.

The courseware list is used to display all downloaded courseware in the current classroom, and it is also a collection of all courses that can be opened at the current time. Among them, each courseware in the list will also contain a corresponding scene list. Therefore, scholars and experts apply knowledge such as mathematics and statistics to classification problems. The student list is used to display all student seat information in the current classroom, including seat number and student learning status. Among them, the student state includes four different states: ready, learning, offline, and abnormal. When the students are in the learning state, the student list calls the video player to display the pictures that all the students see in the virtual reality headset, as shown in Figure 4.

Many network communications are implied in the system requirements, including active requests, such as the teacher's computer requesting the server for a course list and the sending of messages such as opening a course, as well as many messages pushes, such as the server actively asking the student's computer to push the message of synchronizing courseware and the news of opening the course. It increases the difficulty of machine learning, and the learning effect is poor. Therefore, it is necessary to abstract the network communication into a separate basic business module, which can provide basic network services including active requests and message push to other components of the business layer. At the same time, after the network communication is extracted into a separate module, all network requests in the system can be uniformly authenticated and processed by the system authorization module, so that all illegal requests can be uniformly processed.

Both system authorization and content protection require access to hardware information, require close interaction with the operating system and the host hardware itself, and are therefore handled as separate components. The server, teacher computer, and student computer all contain a system authorization module. The system authorization module in the server records the information of all legal devices in the classroom and rejects the access request of unauthorized devices.

The courseware management module includes the network communication and content distribution components in the server, the network connection and courseware management of the teacher's computer and the student's computer, and the file transfer of the student's computer [21]. Invoke the network communication module and content distribution module provided by the basic business layer in the server to automatically download the authorized courseware from the content cloud store. When the teacher starts a class, the file transfer module is invoked on the student computer to quickly transfer the courseware to all online student computers, and the instruction to start the

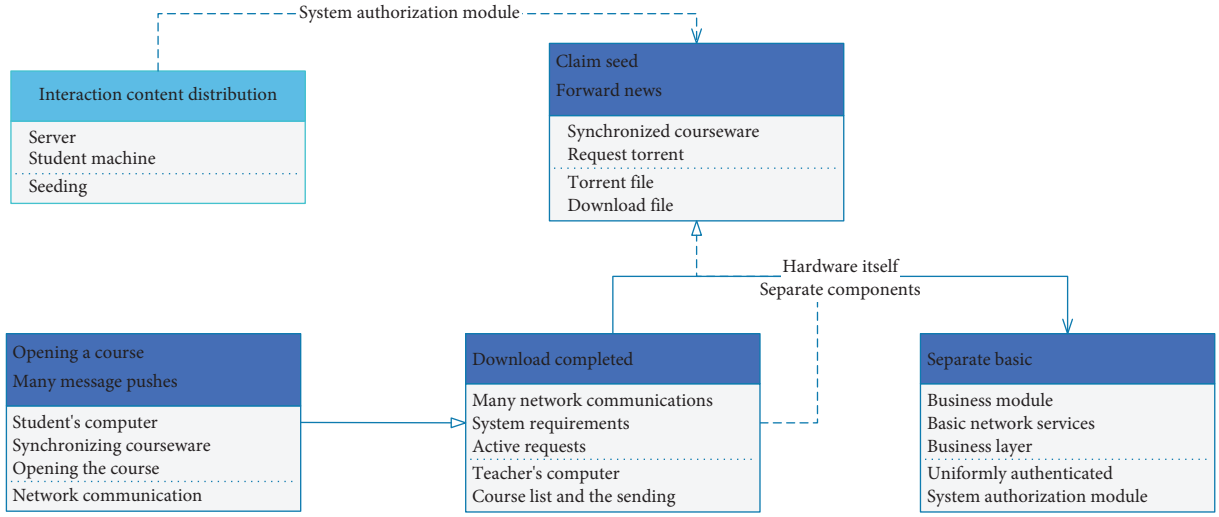

Figure 4: Content distribution sequence diagram.

class is pushed to the student computer terminal through the server. In addition, this module provides push forwarding of messages such as switching scenes and ending courses through the courseware management component and provides courseware and scene query services to the teacher's computer terminal.

4. Result Analysis

4.1. Performance Analysis of Big Data Fuzzy K-Means Clustering Algorithm. At first, analogous to the traditional multimedia classroom, the demonstration teaching was to meet the needs of the students' computers to view the pictures of the teacher's computer and to project the pictures of the teacher's computer to the students' computers. This process can be regarded as the reverse process of the teacher's computer viewing the student's computer screen. Therefore, it is usually necessary to make various improvements to the cluster analysis method according to different problems and needs to meet its clustering needs. The teacher's computer to view the student computer screen is to send the video stream of all student computers in the classroom to the teacher's computer through the streaming service module, and the demonstration teaching currently is to send the desktop video stream of the teacher computer to all students in the room at the same time. The analogy to the scheme in the teacher computer viewing the student computer screen in the previous courseware management chapter, because WebRTC itself does not support the broadcast mechanism, the video stream captured by the teacher computer can only be added to the corresponding connections of all student computers to simulate broadcast mechanism. Correspondingly, when the teacher computer ends the demonstration teaching, it traverses all online student computer numbers to find the corresponding Peer Connection object, then closes the connection.

After the relevant functions developed and launched, they will undergo a second demand adjustment. The demonstration teaching function has been redefined from the perspective of demand from the initial analogy to traditional multimedia classrooms and more integrated with the scene characteristics of virtual reality teaching. Teachers can also wear virtual reality headsets to demonstrate virtual reality to students during class. In the operation of the real scene and the explanation of relevant knowledge points, the demonstration teaching function needs to be able to synthesize the virtual scene in the teacher's head-mounted display and the teacher himself into the same scene. After the requirements are adjusted, it is completely different from the previous requirements. At the same time, this result also tells people from another aspect that using neural networks for deep learning must require enough training samples. If the previous plan is modified, at most, the students can only see the picture of the teacher's head-mounted display but cannot be directly related to the teacher's operation, resulting in the previously realized solution can only be discarded, and the technology selection needs to be reselected, as shown in Figure 5.

The traditional initial clustering center often randomly selects K sample data as K clustering centers in the sample data. On the one hand, this selection method increases the probability of isolated points being used as clustering centers. The probability that multiple cluster centers is close increases; the emergence of these two situations leads to the deterioration of the quality of the clustering results. At the same time, due to the randomness of the selection of the clustering centers, the clustering results are not stable. Multiple clustering may occur, and the results will vary each time, making the clustering results difficult to apply in practice.

To verify that the fuzzy clustering algorithm (FCM) based on a genetic algorithm can improve the effectiveness of the center point sensitivity of the fuzzy clustering algorithm, this paper compares the GA - FCM algorithm with other clustering algorithms, using the machine learning library from UCI, respectively. There are certain barriers. There are few college teaching management system development companies in the market and there is a certain

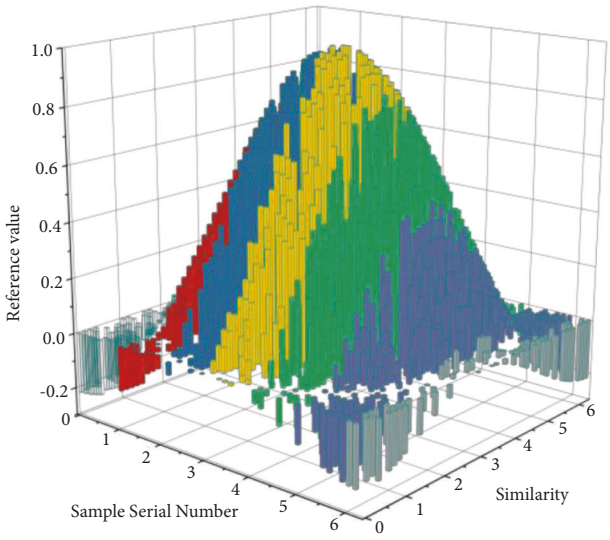

Figure 5: Based on AFV similarity calculation result.

monopoly. The three standard datasets of Iris, wine, and crude oil are used to simulate these algorithms. The following is a brief description of these data sets: Wine data set is the analysis of various parameters of wine; Iris data set is the result of statistical analysis of various aspects of iris plants. Below we take the Kth neuron as an example to design, as shown in Figure 6.

The variance of the output value is smaller than the variance of the actual value, indicating that the fluctuation between the output value and the average value is smaller, which is caused by the higher final grades and lower data volume in the training set, which increases the difficulty of machine learning, and the learning effect is poor. At the same time, this result also tells people from another aspect that using neural networks for deep learning must require enough training samples. Only in this way can the learning effect be guaranteed.

The fitness function of the genetic algorithm reaches the maximum value for the first time, but it does not converge directly, but finds the second extreme point in the 7th time, until about the 13th time, and finally converges to about 66.03280034. Therefore, the relationship between software companies and colleges and universities is in a delicate state. This fully reflects the advantages of the fast convergence of the FCM clustering algorithm and the characteristics of the global optimization of the genetic algorithm do not make the clustering prematurely converge to the extreme point but finally find the global optimum. Course application and registration can be carried out according to the requirements of the training objectives, and at the same time, it can also make detailed inquiries about the courses declared by individuals.

4.2. Test Results of Teaching Management System. Through this module, academic leaders can query and review the published articles and directly respond to the needs of the articles that need further revision before they can be

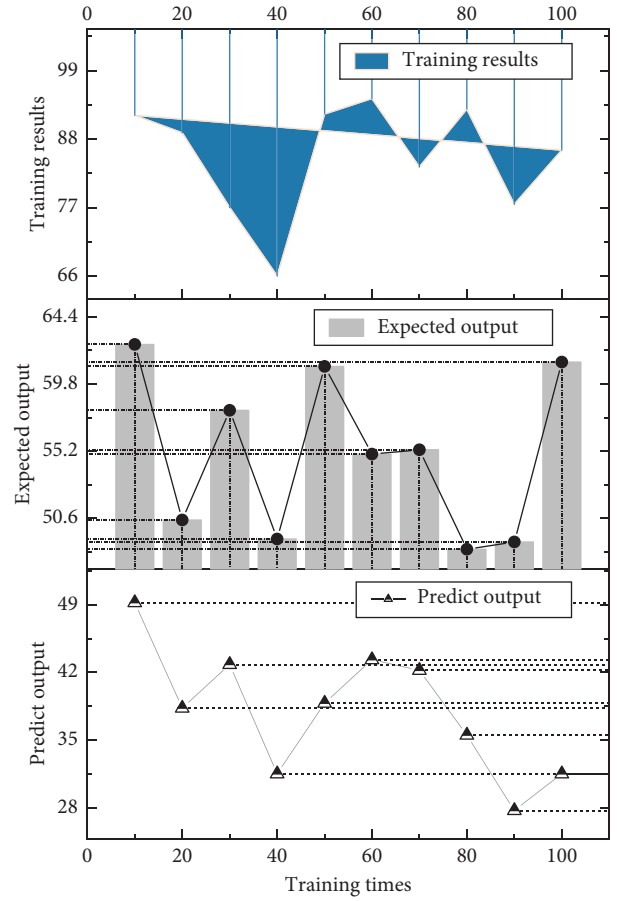

Figure 6: Comparison of training results with ground truth.

published. Edit the revised opinion information, save, and upload it, and the system will update the review status of the article. According to the actual requirements of the college, the academic staff can set the most important articles to the top of the published articles according to their importance. During the operation of the function of managing articles, the academic leader selects "manage articles" on the homepage of the online teaching management system of Sajin Institute of Technology, then queries the articles to be published in the displayed interface, and enters the article review information. After the operation completed, the basic information of the article is directly saved and uploaded to the database, and then the article is pinned according to the actual needs.

College students can inquire about the detailed information of personal data after entering the homepage of the system according to their actual needs and can edit basic personal information such as individuals. After the operation is completed, the personal information data in the database can be updated by saving it directly. Combined with the specific design, in the course arrangement of the teaching plan module, the system needs to reasonably arrange the courses for this semester according to the educational administration plan. The professional courses that need to be added can be added to the system platform, and the professional courses that are not needed can be deleted

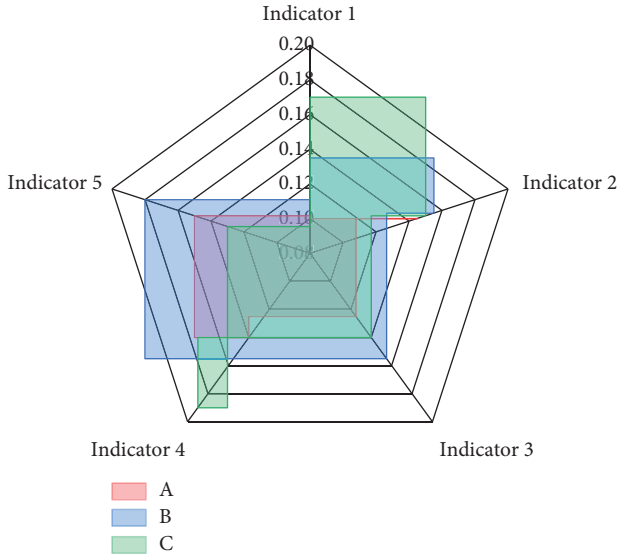

Figure 7: Indicator achievement degree chart.

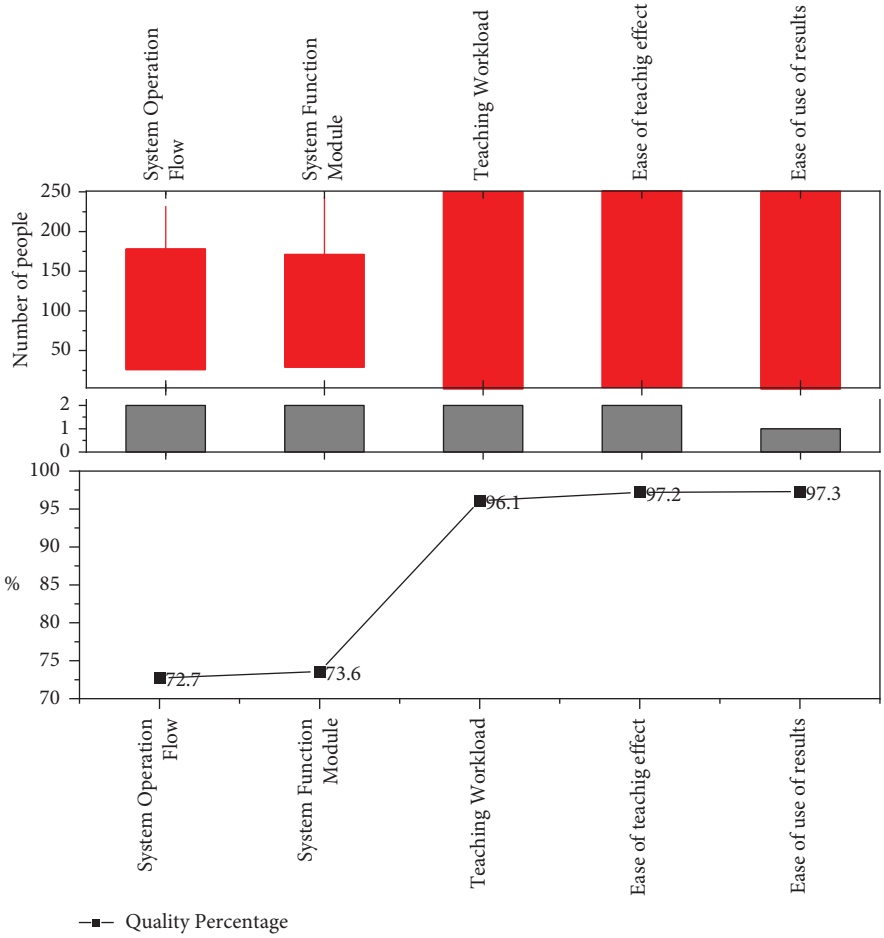

Figure 8: Satisfaction results of the teaching performance appraisal system in colleges and universities.

immediately, that is, control over courses and majors. Combined with the design, the specific implementation of the remote teaching plan management interface is shown in Figure 7. According to different majors, the system administrator can formulate a specific teaching plan according to the arrangement of the educational affairs. The research

on the key influencing factors of the scope management of college teaching management projects is of great significance to the scientific and orderly construction of the entire teaching management system project.

System database design is mainly based on the specific design method of database logic structure and data information table. A big difference between virtual reality classrooms and traditional multimedia classrooms is that virtual reality classrooms need to distribute large-scale courseware content. It takes a lot of time to transmit virtual reality teaching courseware using a traditional content distribution scheme. The system is designed to distribute content in a P2P manner so that the transmission time does not increase linearly with the increase in the number of students' computers. Usually, a courseware distribution can be completed in about half a minute, which significantly shortens the transmission time, as shown in Figure 8.

Although the scale of use of the system is small and the amount of data is small, it can be seen from the survey results and the interviews with the relevant persons in charge of the project that the system further improves the work efficiency of teaching staff and management personnel facilitates teachers and students. It provides a blueprint for the development and management of other subsystems and modules of the *Z* university teaching management system in the future. Therefore, constructive opinions and suggestions are put forward for the management of college teaching management system projects at various stages, especially for scope management. At the same time, the validity of the model proposed in this paper is preliminarily verified within a certain range.

Teachers can distribute test questions to students during class. Teachers can use this system to distribute all the test questions that have been prepared before class to students with the same questions, or they can assign different test questions to groups; set the test time. When all students have completed their answers or the test has timed out, teachers can view the answers of all students through the teacher terminal.

5. Conclusion

Based on the K-means clustering algorithm, this paper constructs two K-means clustering algorithm frameworks with different constraints, and its effectiveness is verified by many experiments. Combining data space structure constraints with the K-means clustering algorithm, a clustering model with clear and unified objective function constraints is proposed. The coding method not only affects the operation of the genetic operator but also affects its convergence speed and accuracy, so the coding method is important in the genetic algorithm. Through analysis, the FCM clustering algorithm is prone to premature convergence in data processing and thus cannot achieve the global optimum. Therefore, after research and use of the genetic algorithm and the FCM algorithm in combination, GA- FCM can effectively use the genetic algorithm and the FCM algorithm. The advantages make it better applied to undergraduate engineering quality certification. Using the model method, the obtained AHP hierarchical structure model is used to construct the key influencing factor matrix and through the ISM method, the explanation structure model of the key influencing factors of the teaching management project scope management is obtained, and the relationship between the factors is clarified. In the improvement of the project, the validity of the model is verified.

Data Availability

The data used to support the findings of this study can be obtained from the author upon request.

Conflicts of Interest

The author declares that there are no conflicts of interest or personal relationships that could have appeared to influence the work reported in this paper.

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