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Research Article

An Informatization Model of Scientific Computing for Mining Association Rules Used in Teaching Management Evaluation

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The management information system is a kind of information-based, people-oriented, and socialized service as its purpose. It adopts advanced technology to realize the management of teachers, students, and other related personnel while effectively improving the quality of teaching. This article first analyzes the overview of data mining technology. Secondly, it analyzes the related algorithms of association rules. Finally, this article introduces the demand analysis of the university teaching quality evaluation system based on the scientific calculation of association rules. According to the demand analysis results, the system module and the corresponding submodule function modules are determined, and finally, the system architecture model is designed. Experimental results show that this model is useful for providing the effectiveness of information management.

1. Introduction

With the innovation of decision-making science and the development of modern management theory, scientific calculation based on association rule mining is gradually introduced into the application of management evaluation in universities. This makes the working methods of university administrators gradually change from traditional empirical management methods to modern management theories and methods. This change has made university administrators more creative. The traditional empirical management method only one-sidedly emphasized the particularity of education, while ignoring the commonality between public management and education management. It focuses its work on management methods based on experience. The scientific management method allows managers to combine their own experience with scientific methods to improve the management of universities.

2. Overview of Data Mining

2.1. Data Mining Definition. At present, data mining technology is widely used in various fields. This technology can effectively extract the data needed by enterprises from the market, and it can form a data set of these data. The data set can be structured or unstructured, and the corresponding results can be obtained by processing and analyzing these data sets. Of course, when universities use this technology to mine data in the market, they will not only mine related data for one field or industry. They generally involve many different regions, and the fusion of these regional data is the intersection of these different regions. The relationship between data mining and other disciplines is shown in Figure 1 [1].

2.2. Functions of Data Mining. The task of data mining is to find hidden and meaningful information and knowledge from the database. In terms of its functions, it is generally divided into the following categories:

2.2.1. Concept Description. The purpose of concept description is to briefly and comprehensively describe the data in the database. Statistics as we know is actually one of the simplest conceptual descriptions. They use data volume, mean value, square difference, or online analytical processing technology (OLAP) to perform multidimensional analysis and

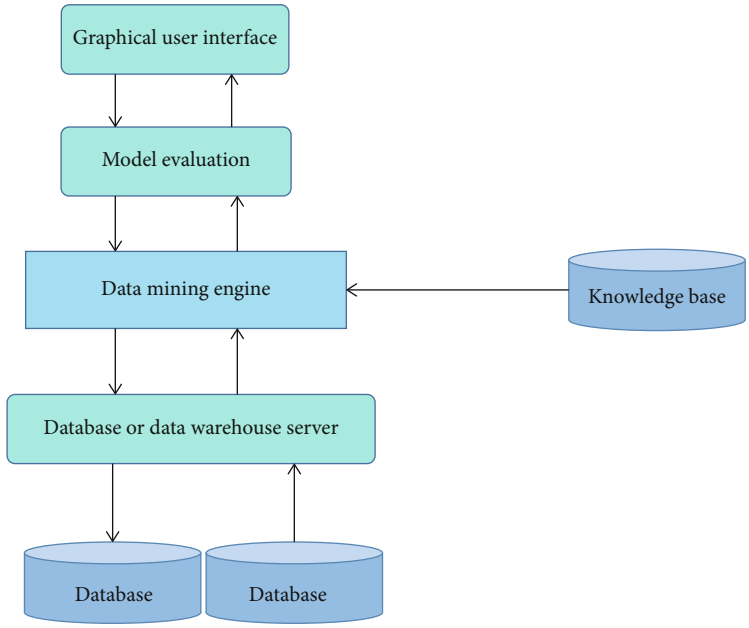

Figure 1: Typical data mining system.

query operations on data, and use histograms, line graphs, and other intuitive ways to display [2, 3].

2.2.2. Correlation Analysis. The core meaning of correlation analysis is to compare and correlate data obtained in different fields and then obtain a high-quality result by looking for the connection between the data. With the continuous update and expansion of the database, the content of its management and analysis has become more and more extensive, and the fields involved have become more and more extensive, which makes the database attract the attention of people from all walks of life. Association analysis finds eye-catching associations and connections with a large number of business transaction databases, so that users can make business predictions and decision-making. The main methods of association analysis are the classic Apriori algorithm and FP tree growth algorithm.

2.2.3. Classification and Prediction. The main purpose of classification is to extract important data, which can be used to predict location objects to obtain conceptual models, and relevant personnel will classify these conceptual models obtained from data information. When the predicted value of a data value is missing or unexpected, it is usually called a prediction. There are many applications for classification and prediction.

2.2.4. Cluster Analysis. The object of cluster analysis is data. The main idea is to analyze the original data. The original data refers to the data without descriptive information and the data without any classification mode. After that, the data is divided into different types of structures. Contrary to classification, clustering is to classify data objects without prior knowledge, which is convenient for stratifying survey information and grouping events with similar information together [4].

2.2.5. Outlier Analysis. Some data objects in the database may not follow the behavior or pattern of the compiled data. These data objects are called outliers. In order to reduce the impact of these anomalies, many mining algorithms isolate them. However, these individual sections are not always useful and sometimes contain important information. For example, when fraud is detected, anomalies usually indicate that fraud is more likely and more likely to stimulate our interest [5].

3. The Process of Data Mining

Data mining refers to the processing and analysis of database instances and the establishment of data patterns or functions to describe the characteristics and relationships between data. The process of data mining is shown in Figure 2.

4. Methods of Data Mining

4.1. Neural Network Algorithm. The research of artificial neurons comes from the theory of brain neurons. It is recognized that the complex nervous system is composed of a large number of neurons, thus forming a complex organization structure. If the human body feels an external stimulus, it will immediately respond accordingly. For example, if a person's hand is accidentally punctured by a needle, he will shrink his hand unconsciously. The working process of the neural network is quite complicated and transparent to the user. The user can only see the input and output and cannot see the process of transferring information between neurons. A neural network method is a data mining algorithm that simulates the human nervous system [6].

4.2. Genetic Algorithm. A genetic algorithm is an algorithm based on biological genetic variation theory to model the biological evolution process. The idea of the algorithm is to first

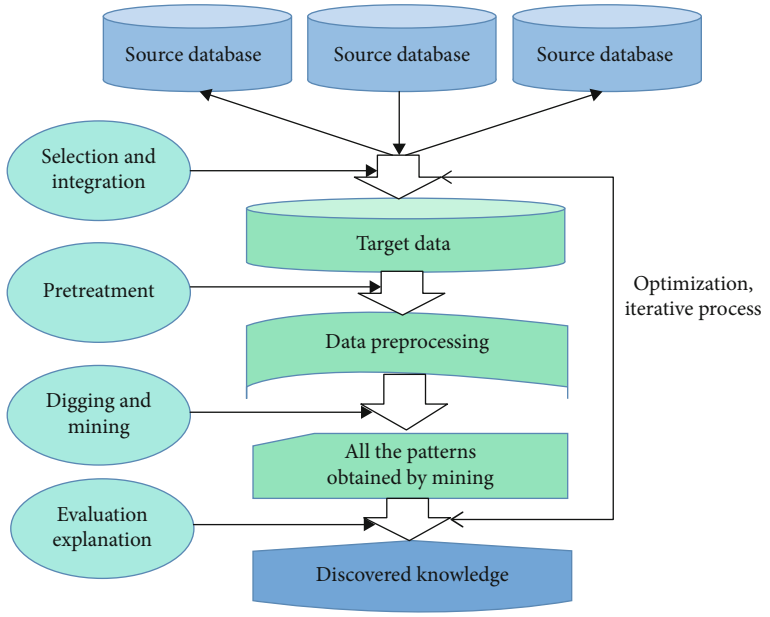

Figure 2: Data mining process.

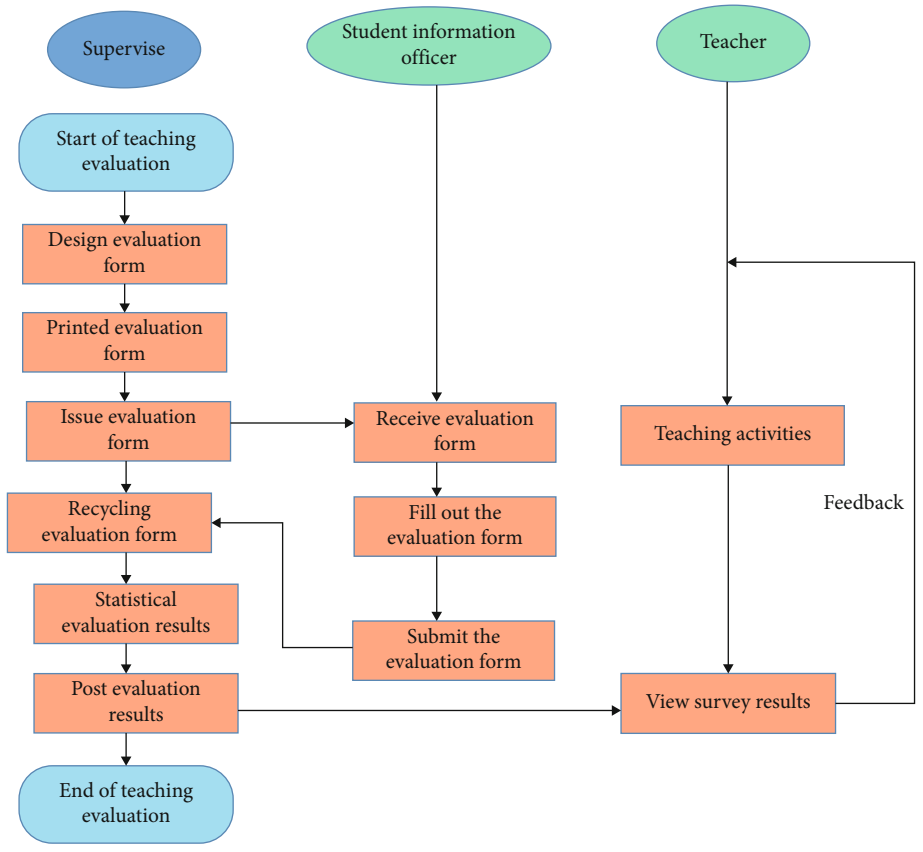

Figure 3: Flow chart of teaching quality evaluation activities.

identify the research object, initialize the population and encode the object, then randomly generate multiple intersections and mutation points with a small probability to generate new individuals, and add new individuals to the original population. When the new ontology breeds the next generation, look for a population with high adaptability. The adaptability can be calculated by an adaptability function, which must be determined according to specific research questions [7].

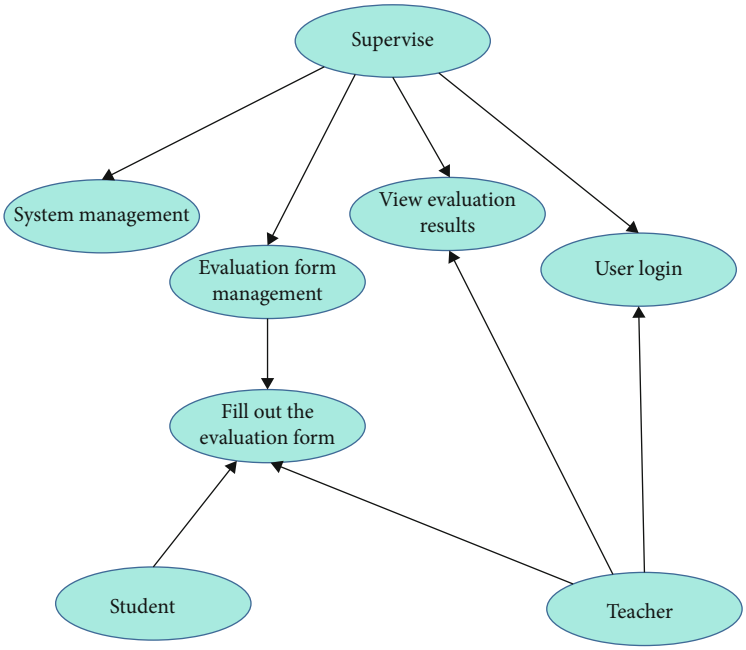

Figure 4: Use case diagram at the top of the system.

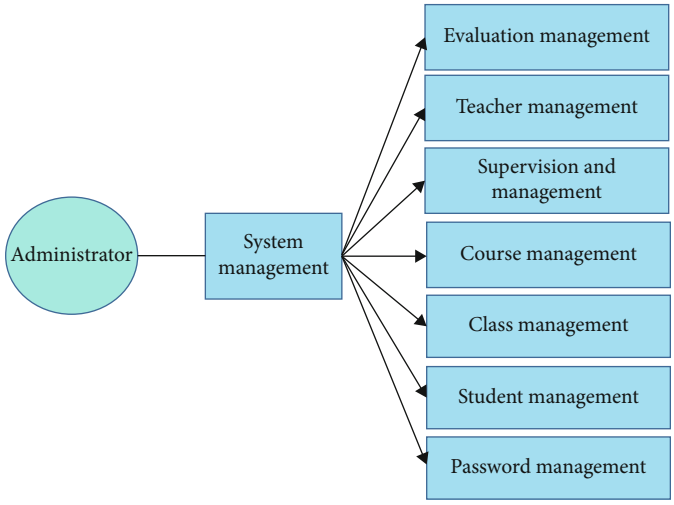

Figure 5: System management use case diagram.

4.3. Decision Tree Method. In essence, a decision tree classifies data through some rules and completes the screening of information through such a process. It can better block data and has strong applicability. This article uses the decision tree method to evaluate the management of colleges and universities; the following is a detailed elaboration.

It can be known from Shannon's information theory that the amount of information $I(a_i)$ of an event a_i with a probability of $p(a_i)$ can be calculated as shown in

$$I(a_i) = p(a_i) \log_2 \frac{1}{p(a_i)}. \quad (1)$$

If $a_1, a_2, a_3, \cdots, a_n$, for n mutually incompatible events, there is only one occurrence between them; then there is the following average amount of information as shown in

$$I(a_1, a_2, \cdots, a_n) = \sum_{i=1}^{n} I(a_i) = \sum_{i=1}^{n} p(a_i) \log_2 \frac{1}{p(a_i)}. \quad (2)$$

In the above formula, the base of the logarithm is any value and can be changed. But different values correspond to different units, usually 2 can be taken, and the following

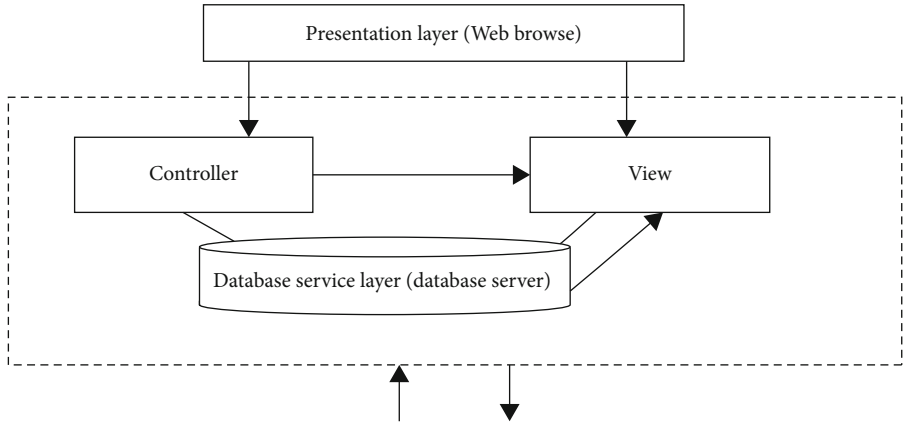

Figure 6: Web three-tier model based on B/S approach.

conditions are specified; when $p(a) = 0$, formula (3) is obtained:

$$I(a_i) = p(a_i)\log_2\frac{1}{p(a_i)} = 0. \tag{3}$$

The decision tree is now defined in more detail. Assuming that the set sample is S, $|S|$ is the number of selected training samples; $|S|$ can be divided into $C_1, C_2, C_3, \cdots, C_n$ different categories. Among them $|C_1|, |C_2|, |C_3|, \cdots, |C_n|$ represents the number of elements of the class [8]. In this way, the probability of belonging to C_i in the set s is shown in

$$p(S_i) = \frac{|C_i|}{|S|}, \tag{4}$$

$$\text{Entropy}(S, A) = \sum\left(\frac{|Sv|}{|S|}\right) - \text{Entropy}(Sv). \tag{5}$$

The information gain of attribute A on set S is represented by $\text{Gain}(S, A)$, as shown in

$$\text{Gain}(S, A) = \text{Entropy}(S) - \text{Entropy}(S, A). \tag{6}$$

If there is no single evaluation object, an evaluation matrix M needs to be established, and these variables need to be normalized. The matrix is represented by the following equation:

$$M = x_{11}\begin{bmatrix} x_{11} & x_{12} & \cdots & x_{1k} \\ x_{21} & x_{22} & \cdots & x_{2k} \\ \vdots & \vdots & \vdots & \vdots \\ x_{p1} & x_{p1} & \cdots & x_k \end{bmatrix}. \tag{7}$$

The optimal value and the worst value are determined by

$$F^+ = \left(\left(\max_i x_{ij} | j \in J^+\right) \text{ or } \left(\min_i x_{ij} | j \in J^-\right)\right)^T, \tag{8}$$

$$F^- = \left(\left(\min_i x_{ij} | j \in J^+\right) \text{ or } \left(\max_i x_{ij} | j \in J^-\right)\right)^T. \tag{9}$$

$d+(i)$ is the difference between the evaluation value and the best point, and $d-(i)$ is the difference between the evaluation value and the worst point; then formulas (10) and (11) are obtained:

$$d^+(i) = \sqrt{\sum_{j=1}^{m}\left(x_{ij} - x_j^+\right)}, \quad 1 \le i \le n, \tag{10}$$

$$d^-(i) = \sqrt{\sum_{j=1}^{m}\left(x_{ij} - x_j^-\right)}, \quad 1 \le i \le n. \tag{11}$$

Through the calculation formula, the deviation degree is obtained as shown in

$$c_i = \frac{d^-(i)}{d^+(i) + d^-(i)}, \quad 1 \le i \le n. \tag{12}$$

In the process of evaluation, it is necessary to check the reasonableness, so that the evaluation value can be corrected. This paper uses the consistency test method, D represents the comparison matrix between the evaluation value and the test value, d_{ik} represents the evaluation value, and d_{kj} represents the test value and is calculated with

$$d_{ik}d_{kj} = d_{ij}, \tag{13}$$

$$CI = \frac{\lambda_{\max} - n}{n - 1}. \tag{14}$$

The classification using the decision tree method is divided into two stages: the purpose of the first stage is to obtain the corresponding knowledge and results from the obtained data. The main content is to use the data in the training set to build a decision tree and create a decision tree model. The second step is to use the generated decision tree model to classify unknown data samples. The data samples are sorted from the root node of the decision tree, branching

down at a time, until a certain leaf point is reached. At this time, the class represented by the leaf point is the object class.

The main content of the decision tree method is to build a high-precision, small-scale decision tree. The construction of the decision tree can be completed in two stages. The first step is to build a decision tree: this step is the process of building a decision tree by obtaining data from the sample set. Generally speaking, the practical sample data set has a certain general level, which is suitable for the data set of historical and practical needs. The second stage is the pruning of the decision tree: this stage is mainly carried out by modifying the decision tree that survived the previous stage. It checks the preliminary rules that appeared during the tree formation process and prunes branches that affect the accuracy. This can reduce the impact of noise data on classification accuracy.

The decision tree method can classify data to complete data screening. This classification process is more important. But this method has drawbacks when processing data sets. When dealing with the binary classification problem of the tree in the model solution, it is necessary to calculate the Gini index of all possible values of each possible dimension and then lay a layer of binary tree at the depth or leaf point of the tree. The binary solution tree created at this time can better classify the data. However, when the data scale is large, creating a solution tree containing all values in each dimension of all templates requires time and computing resources. Researchers proposed a solution tree acceleration algorithm model based on eigenvalue interval division, which can be used to classify large-scale data sets.

This article classifies decision tree methods into data mining methods. Decision tree methods are not only a data classification method but also a data mining method. The decision tree method can be applied to the teaching system, because the decision number method can remove useless information from a large amount of data and extract useful information. After this is applied to the teaching system, the system can delete useful learning websites for students and filter out vulgar websites.

The decision tree method is based on the "tree" as the method model, and the construction of the decision tree can be divided into two stages. The first step is to create a decision tree: the process of creating a decision tree can be described from a set of training instructions. Generally speaking, the training sample data set is a historical and comprehensive data set used to analyze and process data according to actual needs. The second step is to prune the decision tree: pruning the decision tree is the process of analyzing and changing the decision tree created in the previous step. It is mainly used to verify the initial rules created in the process of constructing the decision tree and the data in the new sample set (called the test data set), and it will remove the branches that affect the accuracy of the prediction.

4.4. Bayesian Method. A Bayesian network is a probabilistic reasoning method, which can effectively infer and process incomplete and uncertain data. It can also effectively deal with incomplete and noisy data sets and solve the inconsistency and freedom of data. Bayesian classification is a statistical classification method that can predict the probability of class members. It uses the values in sampling features to calculate the probability of a sample falling into a specific category, and then, it assigns the sample to the most probable category. Bayesian classification shows high accuracy and speed when applied to large databases [9].

4.5. Method Based on Rough Set. As a convenient calculation method, the original column does not require additional information. For example, the probability distribution in statistics and the membership degree of fuzzy columns can simplify data and obtain knowledge based on the information provided by the data. It can overcome the shortcomings of traditional methods of processing uncertain information, and it can be combined with it to obtain more accurate results, which can improve the ability to deal with uncertain and incomplete information. The original set method first separates the value of the attributes in the information system through estimation and then divides each attribute into equivalence classes and then uses the equivalence relations in the set to subtract the attributes in the information system and finally obtains the minimum decision-making relation. The current relational database management system and the new data warehouse management system have laid a solid foundation for original data mining.

5. Association Rule Mining Algorithm and Its Application in Teaching Management Evaluation

5.1. Association Rule Mining-Related Algorithms

5.1.1. Apriori algorithm. The Apriori algorithm is an algorithm for mining association rules. It uses the idea of two-stage mining, and it is executed based on multiple scans of the transaction database. In the first traversal, calculate the frequency set of data items with all elements of 1, and iteratively perform the following steps: connect the results obtained from the k-th traversal, return the length $k+1$, and set $k+1$ frequent items to be retained. At the end of each traversal, if it is found that no frequency set has been created in this traversal, stop. Therefore, the Apriori algorithm must pass a set of transactions $c+1$ times, where c is the number of elements in the longest frequency set [10]. The algorithm idea of Apriori algorithm is simple and easy to implement. It uses a recursive statistical algorithm to generate a continuous element set, which greatly reduces the size of the continuous element set and this can obtain good performance. But the Apriori algorithm also has obvious shortcomings. First of all, some transaction items in the Apriori algorithm can be judged after the first scan that there is no need to scan again, but the results are scanned multiple times, which greatly reduces the efficiency of the algorithm. During the scanning operation, the database must be reanalyzed for each iteration. When calculating the support of the candidate set, a complete scan is always performed from the beginning of the transaction database, which will cause multiple repeated scans. The traditional Apriori algorithm

generates a large number of candidate sets when solving frequent 2-item sets, which increases the computational complexity of the algorithm. In addition, the Apriori algorithm creates a large number of continuous sets. Due to the large amount of data, more candidate name sets can be created. When there are 1000 frequent 1-itemsets I, the number of candidate 2-itemsets will exceed 1 million, which is an exponential growth. These have high requirements on the running time and running space of the machine, which makes the execution efficiency of the algorithm very low [11].

However, the Apriori algorithm still has some shortcomings that need to be improved. Details are as follows:

(1) Some transaction items in the Apriori algorithm can be judged after the first scan that there is no need to scan again, but the result is scanned multiple times. This greatly reduces the efficiency of the algorithm. In response to this problem, the researchers proposed an improved method, specifically: when the Apriori algorithm generates k-item frequent itemsets, remove some infrequent itemsets, so as not to combine them into candidates again to remove some special transaction records. The counting problem is no longer considered when generating $(k+1)$-item frequent itemsets

(2) The traditional Apriori algorithm always performs a complete scan from the beginning of the transaction database when calculating the support of the candidate set, which will cause multiple repeated scans. Therefore, researchers have proposed a dynamic pattern counting DIC algorithm, which sets markers to divide the database. It inserts a new candidate set generated each time at any starting point, and when scanning a candidate set later, it stops scanning until it encounters a position where the candidate set already exists. Therefore, the algorithm scans the database less times than the Apriori algorithm

(3) The traditional Apriori algorithm generates many candidate sets when solving frequent 2-itemsets, which increases the computational complexity of the algorithm. Therefore, researchers have proposed a DHP algorithm for compressing candidate sets. The DHP algorithm solves frequent itemsets by decomposing the transaction database to construct a hash table. This algorithm drastically reduces the number of candidate sets with the increase of iterations, thus effectively reducing the computational complexity of the algorithm

In this paper, the Apriori algorithm is analyzed in detail. The algorithm can be widely used, and it also has many advantages. The Aprioi algorithm uses a layer-by-layer iterative search method. The algorithm is simple and clear. It does not require complicated theoretical derivation, and it is easy to implement. This algorithm is suitable for association rule mining in transactional databases, and it is also suitable for rare data sets. According to previous research, this algorithm is only suitable for association rule mining of rare data sets, that is, data sets less than a frequency and length.

The Aprioi algorithm is mainly composed of two processes: connection and pruning. In connection, assume that the items in the item set are sorted alphabetically. l1 and l2 are any two item sets in Lk-1; the condition that l1 and l2 can be connected is $(l_1[\,1] = l_2[1]) \Lambda (l_1[2] = l_2[2]) \Lambda \cdots \Lambda (l_1[k-2] = l_2[k-2]) \Lambda (l_1[k-1] = l_2[k-1])$, and the result itemset produced by connecting l1 [1] and l2 [2] is $l_1[1] l_2[2] \cdots\cdots l_1[k-1] l_2[k-1]$. Pruning is mainly to scan the database to determine the support count of each candidate set in C.

5.1.2. FP Growth Algorithm. The FP growth algorithm is an effective algorithm for retrieving frequent itemsets in large databases. This algorithm does not generate a tedious process of generating candidate sets when exploring frequent element sets but uses a divide-and-conquer method. First, it compresses the database that provides frequent elements into a frequent model tree (FP tree), while it retains information related to the element set. Then, it divides the compressed database into a set of condition databases, each condition database is associated with a frequent item, and each condition database is retrieved separately.

The FP growth algorithm compresses the database and provides a set of repeated elements in the repeated model tree. Through two database checks, the frequency of the database is compressed into a complex pattern tree (CE tree) in a descending order according to its mean value, and frequent patterns are obtained by mining the frequent pattern tree. However, there are still performance bottlenecks in the algorithm when constructing the complex model tree. The characteristic of the FP growth algorithm is that it only needs to scan the database twice without creating candidate algorithms. Compared with that of the Apriori algorithm, the FP growth rate performance of this algorithm has been greatly improved, but the FP growth algorithm also has insufficient problems, and more researchers are needed to improve it.

However, the FP growth algorithm still has some shortcomings that need to be improved. Details are as follows:

(1) From the content of this article, we know that the FP growth algorithm compresses all records in the transaction database into a tree (FP tree). The more data content, the larger the content using the FP growth algorithm, so for large databases, it is unrealistic to construct a memory-based FP tree. Therefore, researchers have proposed a method of parallel processing of the database, by segmenting the database data, each segmentation point is individually mined, and finally, the results are merged

(2) According to the content of the article, the FP growth algorithm has a performance bottleneck in the process of mining frequent patterns. Therefore, the researchers proposed an improved FP growth algorithm and its distributed parallel implementation. They improved the FP growth algorithm and pruned the complete pattern tree based on the

frequent closed pattern itemset strategy to reduce the space search and improve the efficiency of algorithm mining

(3) According to the content of this paragraph, the FP growth algorithm is a classic association rule mining algorithm, but its existence query efficiency is low. When mining frequent FP tree, it needs to traverse FP tree repeatedly. Aiming at the above shortcomings, a method using two-dimensional tables combined with hash table technology is proposed to improve the traditional FP growth algorithm. The improved algorithm shortens the running time, and the smaller the support, the more obvious this advantage

(4) According to the content of the article, the FP growth algorithm needs to scan the database twice to compress the database of frequent itemsets into a frequent pattern tree. If it is a small database, the amount of calculation is not large, but for a large database, the time required to scan twice is very long, and the FP growth algorithm also requires a lot of memory. Therefore, researchers have proposed an improved FP tree frequent itemset mining algorithm. Through the test of database data and a comparative analysis with the traditional FP growth algorithm, it can be seen that the improved FP growth algorithm can save a lot of memory usage

The FP growth algorithm is an effective algorithm for retrieving frequent itemsets in large databases. In this process, the algorithm uses a divide-and-conquer method. Then, the specific steps of the divide and conquer method are as follows: first, scan the entire database to find frequent 1-itemsets, and then sort them according to the sort order of the number of endorsements. Use frequent 1-itemsets to create an item header and association based on frequent 1-itemsets in the FP tree in the second step. Point the table 1-itemsets and sort and reset the transaction of the entire database. Secondly, FP tree is composed of "Null" as the root point, so the entire database is divided into several conditional databases (projection database type), each database is associated with a frequent item set, and each conditional database is mined.

5.1.3. Partition Algorithm. The algorithm only needs to traverse the set transaction twice. The algorithm first divides the transaction set into multiple blocks so that each block can be loaded into memory. In the first traversal, all blocks are loaded into the memory one by one, and Apriori is used to find the collection of data item frequency sets within the range of each block. Because the search is limited to one block, these data item frequency sets are not the last frequency set of data items. These sets are combined to obtain a superset of the frequency set of a set of data items. In the second traversal, for each data item set obtained in the first traversal, the actual support is calculated. If the support is less than the support specified by the user, the data item set is deleted. At the end of the second traversal, a collection of data item frequency sets is obtained.

5.1.4. Carma Algorithm. Some existing association rules require users to enter the minimum trust and minimum support before running the mining algorithm. The algorithm needs to run several times to determine whether the minimum confidence and minimum support are too high or too low. The Carma algorithm provides feedback to the user during the operation. Users can adjust the minimum support at any time based on the feedback information. If the user is satisfied with the output, the algorithm can be stopped at any time [12].

6. Application of Association Rule Mining Algorithm in Teaching Evaluation

In terms of teaching evaluation, teaching evaluation is an important part of education. It is a guarantee for guiding education, cultivating high-quality talents, helping society to make full use of educational achievements, and promoting the healthy development of education. Traditional teaching evaluation is mostly implemented with reference to relevant evaluation index systems and questionnaires, and it pays more attention to the results of evaluation. It is used as a basis for teacher promotion and evaluation. Applying association rules to teaching evaluation data will dig out some useful data, which will guide the teaching process and provide support for managers' decision-making.

6.1. Application of Association Rule Mining Algorithm in Student Courses. As the school continues to expand the scale of enrollment, the scale of teaching has also continued to expand, the expansion of majors has accelerated, and the amount of data has also increased geometrically. It is difficult for teaching administrators and class teachers to find out the relationship between previous courses and subsequent courses directly based on the distribution of student test scores and then make decisions such as making and modifying teaching plans based on this.

The correlation analysis of data mining is used here, mainly using association rules to analyze the rationality of the curriculum. For example, according to the analysis of association rules, the *A* course and the *B* course need to be set up in the *C* course. Whether students are unable to understand and accept a certain course, whether the market needs this course, and whether there are special requirements for a certain course, make reasonable arrangements that are conducive to improving student performance and employment. It is also possible to set whether the *A* course and *B* course have a contextual arrangement according to the mining mode of association rules, adjust the teaching plan, and promote student learning. It can also be judged based on this that the *A* course should not be arranged with the *B* course. This can avoid the negative effects of arranging two courses together and making students unable to grasp. In this way, the correlation between courses contained in a large amount of data can be effectively discovered, and the correlation between courses and courses can be discovered

through data mining of the database in the student performance management system.

6.2. Research on the Evaluation of University Informatization Teaching Management

6.2.1. Informatization Teaching Management Design. Informatization education design is based on learning theory, education theory, and communication theory to improve the process and method of students' academic performance. It can fully and appropriately use a variety of strategies and methods to develop modern information technology and information education design. It can organize all links and elements in the learning process scientifically and reasonably. Informatization education planning is known as the core of college teachers' informatization learning ability, which is also the theoretical basis and practical guide for carrying out educational activities under informatization conditions. At the same time, university teachers need to understand a certain educational process.

6.2.2. Implementation of Informatization Teaching Management. Under the influence of educational ideology in the information age, the specific implementation of information-based learning activities is an important part of college teachers' teaching. The implementation of information-based learning is a broad, professional, and flexible activity. Therefore, in addition to traditional teaching capabilities, it also puts forward requirements for college teachers' educational technology, teaching equipment, and professional experimental equipment. Relevant personnel should use the ability of technology to guide college students to use technology to practice, so that they can effectively manage the teaching and learning process, as well as the ability to express language, the ability to organize the classroom, and the ability to write on the blackboard. In the implementation of information-based learning, it is especially necessary to emphasize that in an information-based environment, it is necessary to cultivate the innovative potential of college students, the development and understanding of collaborative learning, and the ability of university teachers to explore learning.

6.2.3. Evaluation of Informatization Teaching Management. Information-based learning evaluation is one of the most powerful tools for college teachers' self-improvement and professional development. This is one of the most effective ways to understand the effectiveness of teaching and the degree of knowledge gained by students. It is necessary to comprehensively evaluate all aspects of the learning goals set by teachers and students to diagnose and correct problems in the learning process in time. School teachers should make full use of the results of the feedback. Evaluating the informatization of teaching is an important part of teachers' informatization teaching ability in the information age. Prior to this, the concept of educational evaluation has undergone major changes. Due to the limitations of traditional teaching evaluation methods, university teachers cannot do this. There is little or no attention to the educational evaluation process. Therefore, it is necessary to advocate multiple learning evaluations and individual learning evaluations.

7. Design of Teaching Management Evaluation System Based on Association Rule Mining Scientific Calculation

7.1. Analysis of Big Data Platform Architecture. The range of data stored is very wide. In data mining, the choice of fuzzy question will affect the actual value of data mining. Therefore, when designing the system, the functional requirements and various functional modules of the system should be clarified. In the operation process of the management information system, the orderly management and automatic processing of the computer can be used to reduce the waste of manpower and material resources. In this way, paperless office can be realized and a complicated work can be simplified. This can also liberate management personnel, allowing them to concentrate on other related tasks, thereby improving work efficiency and quality. The relevant personnel must fully guarantee the accuracy, timeliness, and consistency of the data, so as to ensure the accuracy, completeness, and dynamics of the various information resources provided by the system in real time. This enables colleges and universities to obtain quality assurance in terms of management administration, logistics education, and teaching [13].

The overall management level directly depends on the level of data collection and processing to a certain extent, but the complexity of college data management and the clear and reasonable division of responsibilities are closely linked. Nowadays, accurate and efficient data management methods are indispensable. Improving management transparency and cooperation between different departments requires the same or different departments in different jurisdictions. Employees interact online in real time to achieve common goals or perform their own tasks. Management requirements are the core of this system, so the goal of this system is to achieve key management functions with relatively complete functions.

7.2. Feasibility Analysis

7.2.1. Timing Feasibility. In terms of timing and feasibility, the preparation work for the development of the system is sufficient. Through the investigation of many domestic universities, we have a more comprehensive understanding of the advantages and disadvantages of the university management information system used by the universities. The system has been designed in detail. If the system is successfully developed, it can make college information management more standardized and rigorous, which will bring more efficient business processing and smarter data analysis and processing to colleges and universities, and make college data analysis and processing more efficient [14].

At present, foreign management information systems have been developed relatively well. Many enterprises and scientific research institutions have already used data mining

and other related technologies to analyze their internal data through specialized data analysis companies in order to obtain useful information. In contrast, the domestic management information system is still in the development stage, and it is in its infancy in terms of data correlation analysis and useful rule mining. Under such circumstances, China's university informatization management should fully adapt to the needs of development, and relevant personnel should accelerate the informatization process in order to be further improved.

7.2.2. Economic Feasibility. Evaluating the economic benefits of the developed project is the main purpose of the economic feasibility analysis. Based on the existing university management information system, the system has made many improvements and related improvements, such as handling data consistency between different departments and associations. For the development of the rule analysis module, the development funds of higher education can be obtained in an economic form. Once the system is developed and implemented, it can improve the quality and efficiency of employment and assist in the information management of colleges and universities. Therefore, it is economically feasible to develop the management information system of the University of Mining and Technology in accordance with federal regulations.

7.3. System Function. The teaching management and teaching operation involved in the teaching quality evaluation system include experts, teachers, students, and teaching management personnel. The activity flow chart of teaching quality evaluation is shown in Figure 3.

When analyzing system requirements, it is necessary to consider functional requirements and non-functional requirements. The so-called functional requirements are the description of the services that the system is expected to provide, how to respond to inputs, and the behavior of the system under specific circumstances. Nonfunctional requirements are types of requirements that are not directly related to the specific functions of the system [15]. The system management use case in Figure 4 also includes evaluation management, teacher management, administrator management, course management, class management, password management, and other functions, which are described in detail as shown in Figure 5.

7.4. System Architecture Design Model. Application of the three-tier Web model based on the BS approach: the three-tier BS architecture is shown in Figure 6.

8. Conclusions

This paper designs an information-based teaching management system that integrates association rule mining algorithms. The association rule mining algorithm can achieve the purpose of mining required information from massive data through certain association rules. The information mined by this method can be used for colleges and universities to implement informatization teaching. Management provides a scientific and effective basis. This article uses this method to excavate the required information from the database for the implementation of teaching management to realize information-based teaching management. Future research will continue to test the operating performance and other functional performance of this system, verify the practical applicability of this system, and expand the scope of application of this system.

Data Availability

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

Conflicts of Interest

The author declares no conflicts of interest.

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