Hindawi
Scientific Programming
Volume 2022, Article ID 8121161, 12 pages
https://doi.org/10.1155/2022/8121161

Research Article

Application of Internet of Things Technology in Student Management Evaluation System

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Received 19 March 2022; Revised 1 May 2022; Accepted 9 May 2022; Published 23 May 2022

Academic Editor: Muhammad Usman

In modern society, the rapid development of the knowledge economy makes education become the core resource of a country's economic and social modernization development. Under this circumstance, student management has been paid more and more attention by people. This paper aims to study how to use the internet of things technology to study the student management evaluation system. This paper proposes a data mining algorithm based on the internet of things technology and proposes a decision tree method and an association rule algorithm based on the data mining algorithm. The experimental results of this paper show that the student growth rate in 2018 increased from 10% to 33% in 2019 and then from 21% in 2020 to 35% in 2021. It can be seen that with the development of the economy, the enrollment rate is also increasing, and the number of people who can go to college has increased rapidly. This also increases the difficulty of student management, making teachers' work more arduous, and the complexity of the amount of information leads to a drop in the efficiency of student management. However, the student management evaluation system based on the internet of things technology is beneficial to solving this problem.

1. Introduction

Student management occupies a large proportion in school management, and many schools in today's society still use manual methods for student management. However, as schools continue to expand in size and the number of students continues to increase, manual methods that are inefficient and prone to errors are no longer suitable for the needs of day-to-day school management. Designing and developing a student management system with computer technology and database can realize student management, and automation is an urgent necessity for the student management department. The internet of things technology has originated in the media field and is the third revolution of the information technology industry. The internet of things refers to the connection of any object with the network through the information sensing equipment and according to the agreed protocol, and the objects exchange and communicate information through the information dissemination medium to realize intelligent identification, positioning, tracking, supervision, and other functions.

At present, one of the important directions of student management informatization research is how to explore the potential knowledge in student data and fully explore the value of data in the system, so as to help decision-makers manage and adjust and finally achieve the purpose of cultivating talents in the new era with high efficiency and individuality. The association rule mining algorithm can find the correlation between students' performance, activity, practice, psychology, and other data from a large amount of data and reveal the problems existing in student training and teaching. By mining the results, students' growth can be predicted; the students can be scientifically evaluated; and the characteristics of different students can be fully considered. By mining the results, it is possible to predict the growth of students, conduct a scientific evaluation of students, fully consider the characteristics of various students, and provide more personalized education.

The innovations of this paper are: (1) this paper introduces the theoretical knowledge of the internet of things technology and the student management evaluation system and uses the decision tree classification algorithm based on the internet of things technology to analyze the importance of the internet of things technology in the application of the student management evaluation system. (2) This paper expounds on the strategy tree classification algorithm and the tomographic analysis algorithm. Through experiments, it is found that the student management evaluation system based on the internet of things technology makes the work efficiency of student management higher.

2. Related Work

With the development of education in recent years, the management of students has become more and more difficult. Verma et al. found that internet of things (IoT) technology allows educators and managers to turn data into actionable insights, and educational organizations leverage solutions such as cloud computing on IoT platforms. Verma et al. proposed a five-layer framework to facilitate the automated assessment of student achievement based on the concept of intelligent computing, providing real-time perception and automatic analysis for the system. The five-layer framework proposed by Verma et al. has not been described, which makes the concept of the framework difficult to understand [1]. Ramirez-Noriega et al. found that assessing students' knowledge acquisition is the main task of intelligent tutoring system (ITS). They put forward a proposal to infer the knowledge level of students, gave the general structure of ITS, and proposed an evaluation module based on the Bayesian network; the evaluation module can infer many problems through the relationship of the Bayesian network. They mentioned that the module can find problems; then how to solve the problem is the most important [2]. Papa et al. found that from previous models and strategies used to study academic performance in college students, it is clear that none of them assess T-shaped degrees. The research they provides employs well-established models and strategies to show the monitoring of college students' first-year performance in response to the growing demand for professionals with this characteristic. They did not prove that their proposed strategy is mature and reliable [3]. Nizam found that the most important goal of colleges today is to increase student flexibility and productivity. He mainly discusses the impact of the student exchange process (SEP) on the campus management system (CMS), and for the final impact, he recommends a flexible system design to enhance educational benefits between universities. He makes suggestions, but what exactly is the specific suggestion and is the design real? [4]. He et al. found deep learning to be a promising approach to extracting accurate information from raw sensor data from IoT devices deployed in complex environments. Therefore, they first introduced deep learning for IoT into the edge computing environment. A novel offloading strategy is also designed, and the evaluation results show that this method outperforms other optimization solutions in IoT deep learning. Why He et al. bring deep learning into the edge computing environment is because the connection between the two should be expounded [5]. Hopkins and Hawking find that with the advancement of communication technology, global corporate activities continue to evolve, and many companies are implementing global information systems in order to improve their global operations. In this regard, however, companies face many complexities when implementing them. Although he sees many difficulties in implementing a global system, he does not specify the specific manifestations of the complexity [6].

3. Data Mining Algorithm Based on IoT Technology

3.1. Development of Data Mining. Human beings have more data; human beings have entered the era of big data; and the problem of information explosion has also been exposed. At the same time, computer technology has also made rapid progress [7]. In such an environment, data mining technology emerged. It is a generalized data technology, which has been widely used and developed in many fields and integrates related technologies in many fields. Data mining technology is a technology that can "mine" the knowledge rules that are valuable to users from a large amount of data [8]. Considering the data itself, usually, data mining needs eight steps, including data cleaning, data transformation, data mining implementation process, pattern evaluation, knowledge representation, and so on. The process of data mining is shown in Figure 1.

As shown in Figure 1, the management business of colleges and universities has entered the digital information age from the previous manual mode. Student management is an important part of management in colleges and universities [9]. Students use the information management system of a comprehensive professional school to improve their management level. In recent years, the number of students has increased dramatically with the heightened attention to education. The difficulty of student management has also increased greatly. The growth trend of students in recent years is shown in Figure 2.

As shown in Figure 2, the growth trend of students is getting faster and faster, the student management work lacks a sound management model, and the teacher cannot do a good job in the management work driven by the management model. At the same time, the teacher's understanding of the students' ideological and living conditions is not thorough enough, which affects the management efficiency. And one of the important techniques of data mining is association rule mining. The application of association rule mining technology to the student management of colleges and universities can help schools obtain information hidden in student data and then become an important way for schools to obtain more valuable information [10]. IoT technology is shown in Figure 3.

As shown in Figure 3, association rule mining technology provides more scientific and accurate evaluation

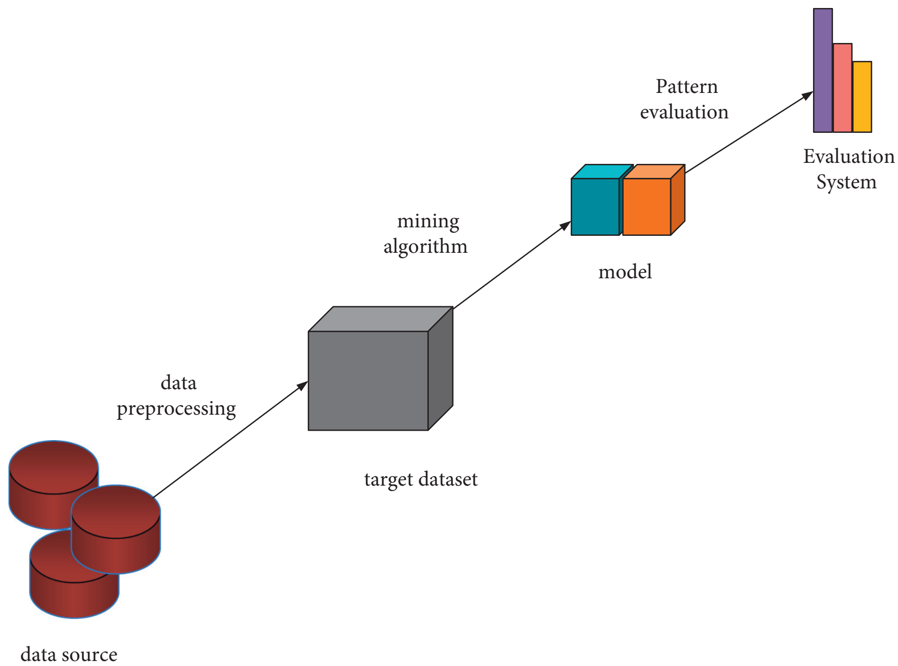

Figure 1: The process of data mining.

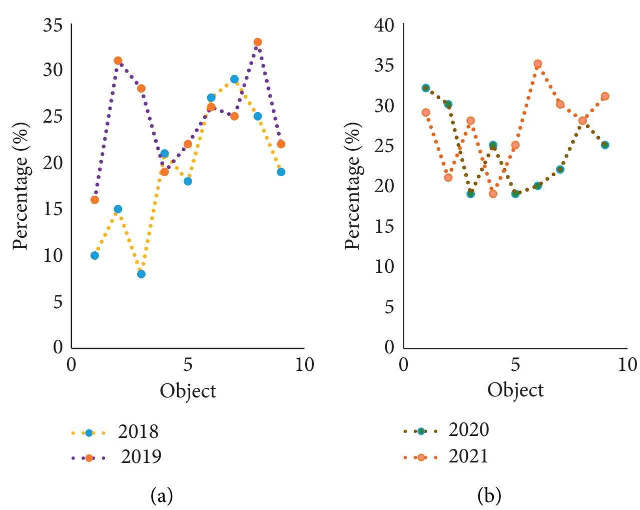

Figure 2: Student growth trends 2018–2021: (a) 2018–2019 student growth trends and (b) 2020–2021 student growth trends.

results, provides positive guidance, and finally achieves efficient and personalized talent training and improves the quality of talent training [11].

The precise definition of the internet of things has not yet been formed. It is generally believed that the internet of things is a network that connects items with the Internet through various sensing devices to exchange and communicate information to achieve intelligent identification, positioning, tracking, monitoring, and management [12]. The application areas of the internet of things are shown in Figure 4.

As shown in Figure 4, with the development of colleges, the reform of student management has gradually deepened, and the learning environment and living environment on campus are getting better and better, but the relationship between students and between students and schools is becoming more and more complicated. Daily life management and education management are also becoming more and more diverse, and all IoT technologies are playing an increasingly important role in student management [13]. Through the internet of things technology, students' psychological, language, action, and other information can be obtained in a short time. This is very helpful in strengthening the management of a small number of students, and it also plays a big role in dealing with some emergencies.

3.2. Decision Tree Classification Algorithm Based on Data Mining. The decision tree algorithm is the most concerned

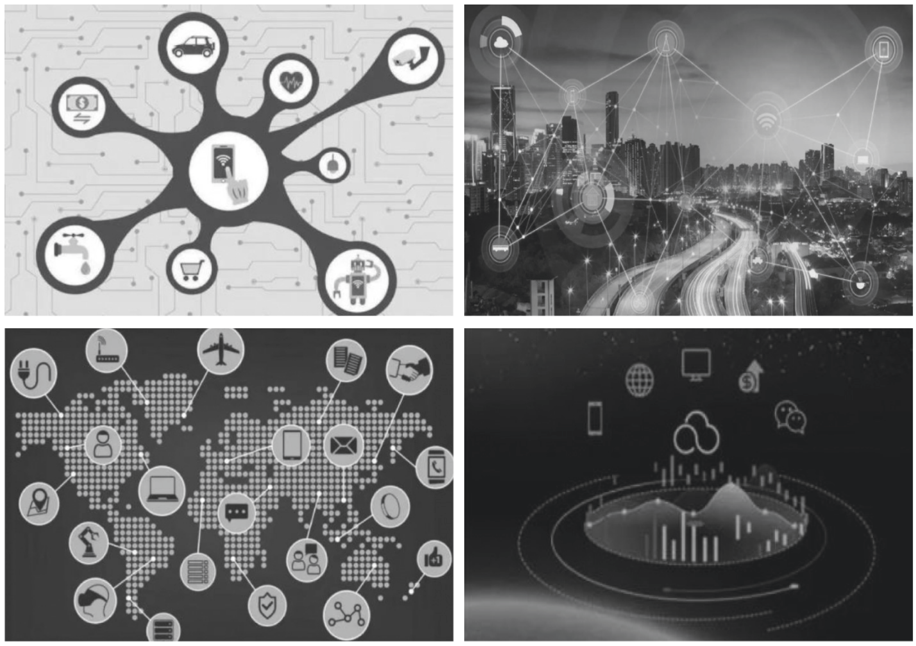

Figure 3: IoT technology.

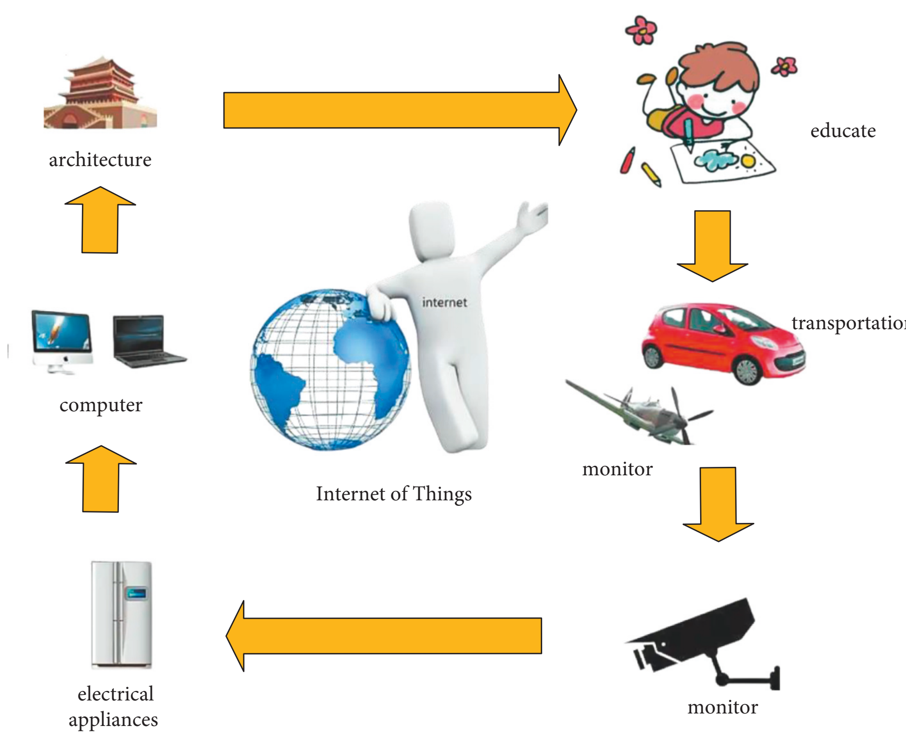

Figure 4: Application areas of IoT.

classification algorithm in data mining. The reason why this algorithm is highly valued in the fields of data mining, artificial intelligence, and machine learning is that the decision tree algorithm has many special advantages over other algorithms. The decision tree algorithm is easy to understand, and the mechanism is simple to explain. The decision tree algorithm can be used for small data sets, and the time complexity is small, which is the logarithm of the data points used to train the decision tree. Compared to other algorithms that intelligently analyze one type of variable, the decision tree algorithm can handle numbers and categories of data. The structure diagram of the decision tree algorithm is shown in Figure 5.

As shown in Figure 5, the first is that its structure is very simple and easy to understand, and the corresponding classification mode is also very easy to convert into

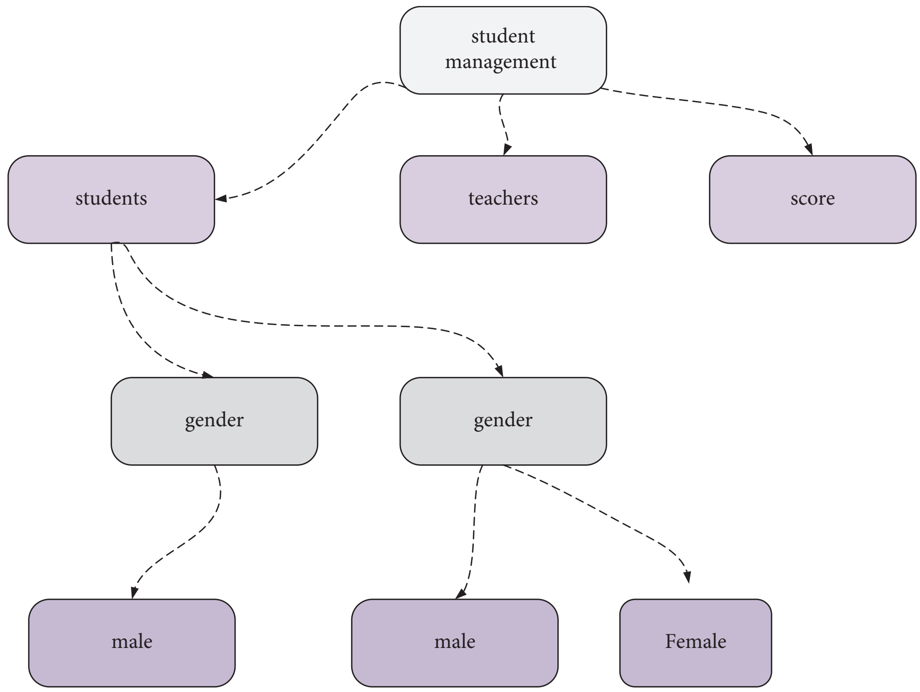

Figure 5: Decision tree algorithm structure diagram.

corresponding classification rules. Second, the decision tree algorithm has a high classification accuracy for the data [14].

3.2.1. ID3 Algorithm. ID3 algorithm is a greedy algorithm used to construct decision trees. The ID3 algorithm has originated from the concept learning system (CLS) and takes the decreasing speed of information entropy as the criterion for selecting test attributes. That is to say, at each node, the attribute with the highest information gain that has not been used for division is selected as the division criterion, and then this process is continued until the generated decision tree can perfectly classify the training samples. Before introducing the ID3 algorithm, first introduce the relevant knowledge of information theory to facilitate the understanding of the algorithm, as follows:

Information entropy represents the uncertainty of the whole information sent by the information source, which is defined as follows:

$$H(A) = -\sum_{i=1}^{r} p(x_i) I(x_i). \tag{1}$$

Conditional entropy $H(A|B)$ represents the uncertainty of the recipient of information B when it receives information A. If the A information is represented by x_i, the B information is represented by y_i, and $p(x_i|y_i)$ is the probability that A is x_i when B is y_i; then the formula is

$$H(A|B) = -\sum_{i=1} p(x_i|y_i) \mathrm{Log}_2 p(x_i|y_i). \tag{2}$$

The average mutual information represents the magnitude of the signal A that the signal B can provide, and $I(A|B)$ is expressed as follows:

$$I(A|B) = H(A) - H(A|B). \tag{3}$$

The key to constructing a decision tree by the ID3 algorithm is the calculation of information gain. Information gain is defined as the difference between the original information demand and the new demand. In probability theory and information theory, information gain is asymmetric and used to measure the difference between two probability distributions P and Q. The calculation process is as follows:

The desired information needed to classify groups in D, that is, the information entropy of D, is

$$\mathrm{Info}(D) = -\sum_{j=1}^{k} p(C_j) \mathrm{Log}_2 p(C_j). \tag{4}$$

The formula for calculating the category conditional entropy classified by attribute A is

$$\mathrm{Info}_A(D) = -\sum_{i=1}^{m} \frac{|D_i|}{|D|} \mathrm{Info}(D_i), \tag{5}$$

where $|D_i|/|D|$ acts as the weight of the ith partition and $\mathrm{Info}(D_i)$ is the expected information required for group classification in the subset D_i partitioned by the value x_i of attribute A.

The ID3 algorithm is suitable for the processing of discrete attribute values. In the case of discrete attributes, the hierarchical structure of the decision tree model is used to show that those attributes have a greater effect on the decision attributes [15].

3.2.2. Optimization of Association Rules for Decision Tree Algorithm. Judging from the existing decision tree algorithms, most algorithm researches focus on the measurement of attribute selection or improve the pruning algorithm. However, in many cases, due to the influence of various factors, such as the redundancy of original data attributes, insufficient information, and so on, the constructed decision tree is always unsatisfactory [16]. The effect of the association rule algorithm on massive data mining is obvious. Using an association rule algorithm to mine knowledge is convenient and easy to understand. Therefore, the research on mining association rules algorithm is also a major field of attention of scholars. However, the number of association rules mined by many association rule algorithms is always astonishingly large, which is bound to be unfavorable to the mining results. Therefore, in order to construct new attributes through association rules, it is extremely important to select which rules to construct [17].

After the approximate exact rule algorithm generates a series of rules, the rule antecedents are integrated into new attributes and added to the original data set. In computer science and operations research, an approximation algorithm is an algorithm used to find approximate methods to solve optimization problems.

The value of the new attribute ABR_1 is as follows:

$$ABR_1 = \begin{cases} 1, & if, X_1 = a_{11}, X_2 = a_{31}, X_3 = a_{31}, \\ 0, & \text{else.} \end{cases} \quad (6)$$

Obviously, the approximate exact rule mining algorithm generally produces more than one approximate exact rule, and the generated new attributes will also become many correspondingly, so if all of them are added to the original data set, it will inevitably cause data set attribute redundancy. To avoid this situation, each new attribute must be evaluated to determine whether it has any value for classification. In this paper, combining the idea of information gain, an evaluation criterion called "approximate information gain" is given [18].

First, take the candidate attribute ABR_i to be evaluated as the root node of a decision tree and calculate the information content of the root node as follows:

$$G_{\text{root}} = -\sum_{j=1}^{n} \frac{n_j}{N} \text{Log}_2 \frac{n_j}{N}. \quad (7)$$

When classifying the sample data with the attribute ABR_i to be evaluated, the number of data records with attribute $ABR_i = 1$ is denoted as N_1, which is calculated by the following formula:

$$N_1 = N * \frac{\sup(R_i)}{\text{conf}(R_i)}. \quad (8)$$

In the data record of attribute $ABR_i = 1$, the number of records of category attribute $B = b_i$ is N_2, which is calculated as follows:

$$N_2 = N * \sup(R_i). \quad (9)$$

In the records with attribute $ABR_i = 1$, the number of records with the value b_i of category attribute B is unknown. Because an approximate exact algorithm is used to generate approximate exact rules, the amount of information contained in this type of data is ignored here [19]. Therefore, the amount of information contained in the records that meet $ABR_i = 1$ in the data set is

$$G_1 = \frac{N_1}{N} \left[-\frac{N_2}{N_1} \text{Log}_2 \frac{N_2}{N_1} \right]. \quad (10)$$

3.2.3. C4.5 Algorithm and Improvement. C4.5 is a family of algorithms used in classification problems in machine learning and data mining. Its goal is supervised learning: given a data set, each tuple in it can be described by a set of attribute values, and each tuple belongs to one of the mutually exclusive categories. The goal of C4.5 is to learn to find a mapping from attribute values to categories, and this mapping can be used to classify new entities with unknown categories. In the decision tree C4.5 algorithm, the test condition for attribute selection in the decision tree model is the information gain rate, and the amount of classification information required for a specified data sample is given as follows:

$$\text{Info}(D) = -\sum_{i=1}^{m} p_i \log_2(p_i), \quad (11)$$

where p_i is the proportion of C_i in the sample, which can generally be calculated by C_i/d.

On the basis of information gain, the information gain rate is developed. When the sample is divided based on the value of attribute A, $\text{SplitInfo}_A(D)$ is the concept of entropy; entropy generally refers to a measure of the state of certain material systems; and the degree to which certain material system states may appear. It is also used by the social sciences as a metaphor for the degree of certain states of human society, such as

$$\text{SplitInfo}_A(D) = -\sum_{j=1}^{v} p_j \log_2 p_j, \quad (12)$$

where p_j is the proportion of samples with the same value a_j on A, which can generally be calculated by d_j/d. Finally, the information gain rate formula of attribute A divided data set is obtained, such as

$$\text{GainRatio}(A) = \frac{\text{Info}(D) - \text{Info}_A(D)}{\text{SplitInfo}_A(D)}. \quad (13)$$

The gain rate of attribute A is defined as $\text{GainRatio}(A)$ is as

$$\text{GainRatio}(A) = \frac{\text{Gain}(A)}{\text{SplitInfo}_A(D)}. \quad (14)$$

After an in-depth study of the C4.5 algorithm, it is found that C4.5 does not handle the phenomenon of overfitting enough and sometimes fails to achieve satisfactory results in terms of accuracy [20, 21]. Therefore, this paper improves the decision tree algorithm. In order to reduce the information entropy of unimportant attributes, a balance coefficient is imported into the calculation process, and the precision of the generated decision tree model becomes higher.

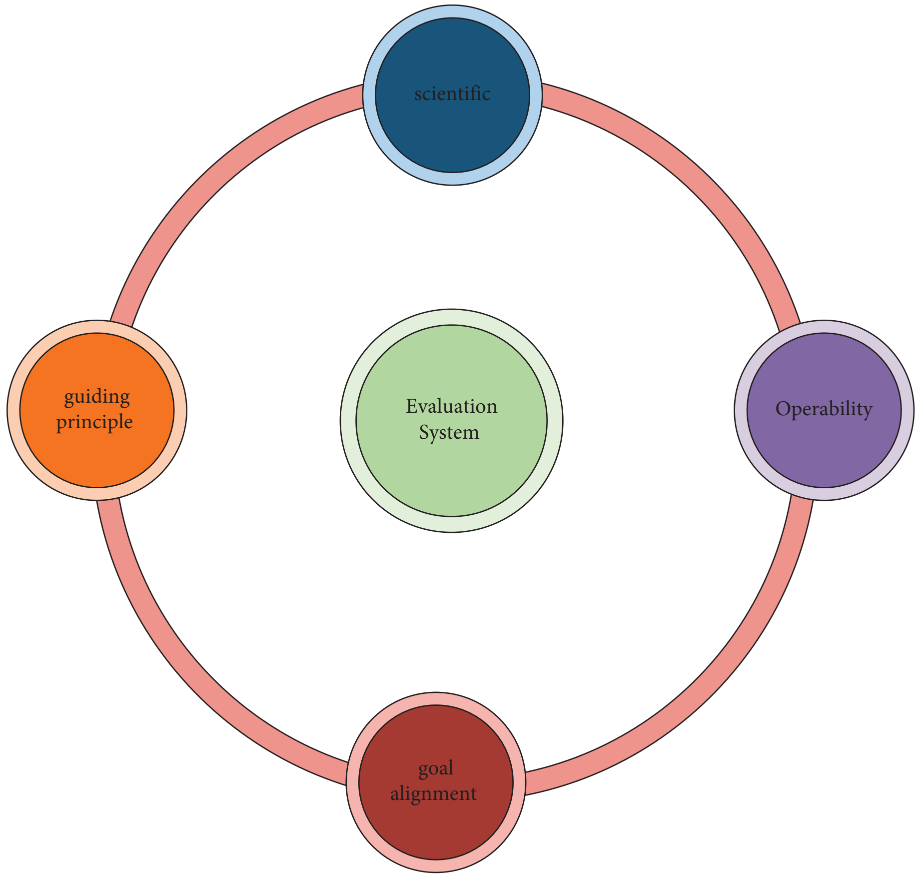

Figure 6: Construction principles of the evaluation system.

According to the characteristics of student evaluation, the balance coefficient ω is set for the evaluation index concerned. The larger ω is, the more interested the user is in this attribute. In order to study the equilibrium degree that should be achieved when the total reflux operation is used to complete a certain separation task, the concept of equilibrium degree coefficient is proposed. When the balance coefficient of all attributes is 0, the result is still the original information gain rate. After introducing the balance coefficient, the formula of the information gain rate becomes

$$\mathrm{Info}_{A\omega}(D) = -\sum_{i=1}^{m}\left(\frac{D_i}{D} + \omega\right)\mathrm{Info}(D_i). \tag{15}$$

By adding the balance coefficient, the improved algorithm can overcome the fact that the evaluation indicators that some users pay attention to are farther from the root node than the nonconcerned indicators in reality so that the decision tree implementation has a higher reference value in a specific environment.

3.3. Construction and Design of Student Evaluation System

3.3.1. Construction Principles of the Evaluation System. Because there are many factors involved in student evaluation and their importance is not the same, it is difficult to obtain an accurate and comprehensive evaluation of students' comprehensive quality. Therefore, the key to constructing a student evaluation system is to reflect the characteristics of the quality of contemporary college students, and these characteristics can just reflect the students' specialties and abilities in all aspects. The purpose of student evaluation is the guiding ideology and purpose of the whole implementation process, which determines the development direction of student evaluation and the final goal to be achieved. At the same time, when building a student evaluation system, the following principles need to be followed, as shown in Figure 6.

The principle of scientificity: as shown in Figure 6, student evaluation of students as a practical activity for judging the quality of students should be guided and restricted by educational scientific theory, and the evaluation system is a concrete manifestation of the guiding and restrictive role. The formulation of the evaluation system not only reflects the objective laws of student education but also follows the laws of talent requirements.

The principle of independence: it is the basic requirement for formulating the index system. There are many factors in the comprehensive quality of college students, each of which is relatively independent, which can reflect the information of all aspects of the students.

The principle of goal consistency: it means that the designed evaluation index must be consistent with the evaluation goal, and the competition index cannot be configured on the same project. The principle of consistency includes the consistency of calculation methods, space-time boundaries, and measurement units.

3.3.2. Steps of Analytic Hierarchy Process

Analytic hierarchy process (AHP) refers to a decision-making method that decomposes the elements that are always related to decision-making into goals, criteria, programs, and other levels and then conducts qualitative and quantitative analysis on this basis. After determining the evaluation indicators of the student evaluation system, people need to determine the relative weights of each indicator. The relevant methods include empirical judgment, Delphi, and AHP. Because AHP has the characteristics of convenient calculation and concise, practical, and rigorous mathematical theory, this paper adopts AHP to determine the weight of the index.

The construction of the judgment matrix is an important step of the AHP. Experts compare all the indicators at the same level, judge their relative importance according to the scaling method, and quantify the judgment results to form the judgment matrix. In order to quantify the judgment result, the calibration method is usually used. After the comparison and quantization are completed, the judgment matrix of the following form can be obtained as follows:

$$X = \begin{bmatrix} x_{11} & x_{12} & x_{1n} \\ x_{21} & x_{22} & x_{2n} \\ x_{n1} & x_{n1} & x_{nm} \end{bmatrix}. \tag{16}$$

To calculate the weights, the judgment matrix needs to be operated and normalized, and there are two common methods: the sum-product method and the square root method. Since the sum-product method is simple to calculate and has sufficient accuracy, this paper adopts the sum-product method to calculate the weight; when using the AHP to calculate the weights of indicators at all levels, the sum-product method is used to find the maximum eigenroot and eigenvector; and the calculation process is divided into the following three steps:

The judgment matrix is normalized, that is, divided by the sum of each column, so that the sum of each column is 1; the formula is

$$y_{ij} = \frac{x_{ij}}{\sum_{i=1}^{n} x_{ij}}. \tag{17}$$

Summing over each row is

$$v_i = \sum_{j=1}^{n} y_{ij}. \tag{18}$$

Calculating the eigenvectors of the matrix, the weight vectors are calculated as follows:

$$w_i = \frac{v_i}{\sum_{i=1}^{n} v_i}. \tag{19}$$

Consistency test of the judgment matrix: generally speaking, if any two elements in the judgment matrix have the relationship of $x_{ij} = (x_{ik}/x_{kj})$, the judgment matrix has complete consistency.

3.3.2. Calculation Example of Index Weight. Solicited the opinions of the teachers, counselors, and relevant experts of the School of Computer Science on the weights of various indicators, used the Delphi method to analyze and weigh the weight opinions, and obtained the final judgment results. Delphi method, also called the expert investigation method, is essentially a feedback anonymous inquiry method. The general process is to sort out, summarize, and count after obtaining the opinions of experts on the problems to be predicted and then anonymously feed them back to the experts, then ask for opinions again, focus again, and feed back again, until getting a consensus, as shown in Table 1.

According to Table 1, the judgment matrix A can be obtained as follows:

$$X = \begin{bmatrix} 1 & 1/5 & 2 & 1/3 \\ 5 & 1 & 5 & 2 \\ 1/2 & 1/5 & 1 & 1/5 \\ 3 & 1/2 & 5 & 1 \end{bmatrix}. \tag{20}$$

Similarly, the judgment matrix and relative weight calculation method between other levels are the same as above. Through the calculation and integration test of AHP, the components of the complete evaluation index of college student management can be obtained.

3.4. Design and Implementation of Student Comprehensive Information Management Evaluation System. The comprehensive student information management system realizes the complete information management of students from enrollment to graduation, including student status, grades, rewards, and punishments. This system realizes data sharing with other systems under the digital campus platform, which effectively avoids the "information island."

A comprehensive student information management system based on B/S mode, which integrates accuracy, efficiency, security, and ease of use, is designed and developed. It solves a series of problems such as low efficiency, low accuracy, and inability to share data caused by the original manual management, so as to make student information management networked and improve the level of student management informatization.

The basic process of student management is as follows: after the freshmen are enrolled, the counselor will enter the student information, and the educational administration personnel will arrange the student number and register the student status after reviewing the student information. Every semester, teachers enter students' grades, and counselors enter students' reward and punishment information, generate a make-up exam plan and register student status and enrollment change information at the same time.

The student management system is very important for the decision-makers and managers of the school; it provides the users with sufficient information and quick query means.

Table 1: Calculation of indicator weights.

U	Ideological and moral quality	Knowledge ability quality	Physical and mental quality	Practical innovation quality
Ideological and moral quality	1	1/5	2	1/3
Knowledge ability quality	5	1	5	2
Physical and mental quality	1/2	1/5	1	1/5
Practical innovation quality	3	1/2	5	1

With the continuous improvement of science and technology, computer science is becoming more and more mature, and its powerful functions have been deeply recognized by people. It has entered various fields of human society and played an increasingly important role. According to the needs of different users for system functions, the system functions are divided into five modules: basic information, student status management, achievement management, graduation management, and data analysis, as shown in Figure 7.

As shown in Figure 7, the score management module includes score entry, score review, make-up test plan management, and score query statistics. Teachers are responsible for entering the test scores for the courses they are responsible for. Academic administrators are responsible for reviewing grades and generating make-up exam plans. Students can check their grades only after the academic administrator has reviewed the grades.

Academic administrators can count the average score and pass rate by class, and the data analysis module includes student information data mining. Using the student information data in the database, through the data mining algorithm, the comprehensive intelligent analysis of the students is realized. The workflow of the system is shown in Figure 8.

As shown in Figure 8, in order to restrict illegal users from using the system, users must perform identity identification when logging in, and legitimate users are allowed to log in. After successful login, they are transferred to the corresponding processing module according to different levels. It draws a more objective evaluation of the student management work of each department and makes a statistical analysis of each department and each assessment item.

There are two ways to log in to the system: one is through the unified login portal on the home page of the digital campus platform, and the other is to directly enter the network address of the system in the browser, which is realized through the login page. After the above two methods successfully log in to the system, if need to enter other business systems of the digital campus platform, do not need to enter the user name and password again, which realizes unified verification.

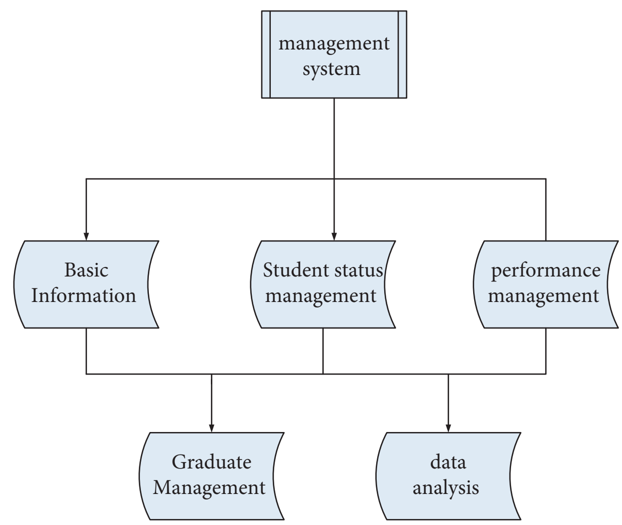

Figure 7: Functional module diagram of student integrated information management system.

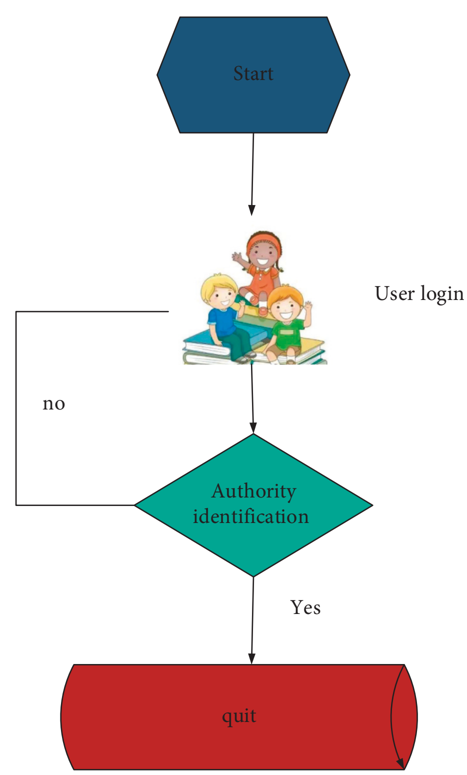

Figure 8: Workflow of the management system.

4. Experiment and Analysis of C4.5 Algorithm Comparison before and after Improvement

Before using the decision tree model, it is necessary to test the decision tree model; the purpose is to test the accuracy of

Table 2: Decision tree model tests.

Sample category	Number of samples	Number of correct identifications	Correct rate (%)	Average recognition rate (%)
Excellent	50	43	86	93.2
Good	100	95	95	93.2
Qualified	150	148	98.6	93.2

Table 3: Comparison of the classification results of the two algorithms.

Model	C4.5 algorithmic model	Improved decision tree algorithm model
Tree level	6	6
Number of leaf nodes	12	9
Leaf node sample proportion average	(18/12)/18∗100% = 8.3%	(15/9)/15∗100% = 10.7%

Table 4: Basic information of UCI data set.

Data set	Number of samples	Number of attributes	Number of categories
Annealing	50	8	4
Balance scale	40	3	2
Glass	30	7	6

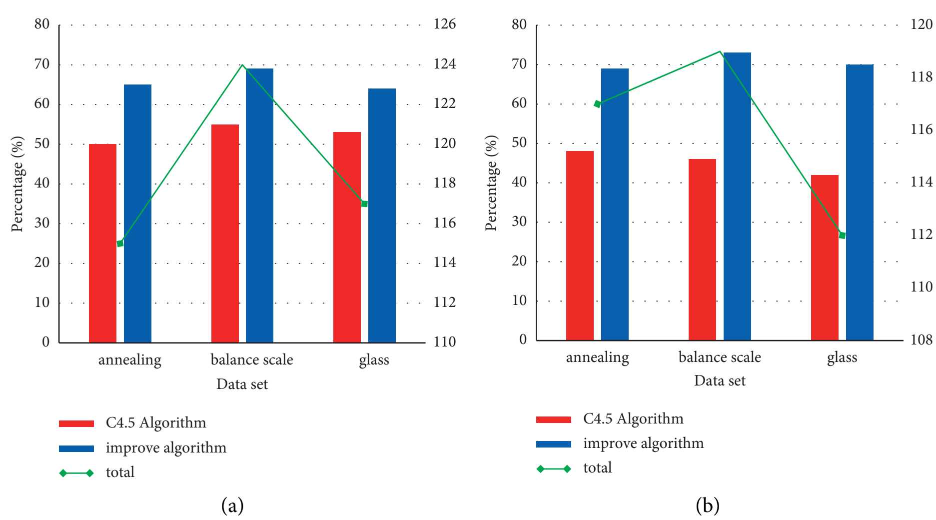

Figure 9: The accuracy of the C4.5 algorithm and the improved algorithm at different experimental stages: (a) the accuracy comparison between the C4.5 algorithm and the improved algorithm in the first five experiments and (b) the accuracy comparison between the C4.5 algorithm and the improved algorithm in the last five experiments.

the decision tree model, to judge whether the decision tree model is effective and whether it can obtain valuable results and apply it to practical work. In this example, the obtained decision tree model is verified with the test data set, and the detailed results are shown in Table 2.

It can be seen from Table 2 that the accuracy rates of the three categories of excellent, good, and qualified are 86%, 95%, and 98.6%, respectively, and the average recognition rate is 93.2%, and the obtained accuracy meets the actual requirements. It can be considered that the decision tree model is effective. In addition, with the increase in sample data, the correct recognition rate of the decision tree model will be further improved.

Using the improved C4.5 algorithm tree, the number of leaf nodes will be reduced, and the number of samples of some leaf nodes will also increase. By adopting the improved C4.5 algorithm, the classification results will be more accurate and reasonable, which is convenient for decision-makers to make correct decisions, as shown in Table 3.

As shown in Table 3, given that the selected sample data set is relatively small, in order to better verify the effect of the algorithm, people use the three data sets of annealing, balance scale, and glass in the UCI database for experimental verification. Table 4 gives the basic situation of the UCI data set.

As shown in Table 4, the execution efficiency of the decision tree model is very high, which is very suitable for the training set of data volume comparison. The decision tree model has very good scalability and can be easily combined with most databases to realize the processing of various data types.

This paper compares and analyzes the accuracy of the C4.5 algorithm and the improved algorithm in different experimental stages through experiments, as shown in Figure 9.

It can be seen from Figure 9 that the improved algorithm is significantly better than the C4.5 algorithm in the classification of the three data sets. It can be seen that the improved algorithm merges branches with relatively high entropy values, that is, merges those branches with little or no contribution to classification. This method effectively controls the generation of fragments and limits the occurrence of overfitting to a certain extent. After setting the balance coefficient, the entropy value of some attributes is reduced, which is beneficial to improving the accuracy of decision tree construction.

5. Conclusion

This paper uses the internet of things technology to automatically obtain student attendance information and realizes the digital task of the daily management of students according to the needs of student information management. The development of a student management evaluation system can reduce the intensity of teachers' daily management work and improve work efficiency. This paper has carried out rich discussions around the internet of things technology and the theoretical knowledge of the student management evaluation system. In the method part, based on the internet of things, an association rule mining algorithm and a decision tree algorithm are proposed, and experiments are carried out on the C4.5 algorithm. It is found that the improved C4.5 can improve the accuracy of decision tree classification, which is also conducive to mining students' information, so as to better manage and evaluate. The traditional student management evaluation system is based on manual work, which is very complex and has a large workload, but it makes the evaluation more accurate and fast. Therefore, this paper is very meaningful to study the student management evaluation system based on the internet of things technology.

Data Availability

No data were used to support this study.

Conflicts of Interest

The authors declare that there are no conflicts of interest.

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