

Retraction

Retracted: Mathematical Modeling and Simulation of Online Teaching Effect Evaluation Based on Decision Tree Algorithm

Journal of Function Spaces

Received 15 August 2023; Accepted 15 August 2023; Published 16 August 2023

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1].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

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

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

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

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

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

References

- [1] P. Sun, "Mathematical Modeling and Simulation of Online Teaching Effect Evaluation Based on Decision Tree Algorithm," *Journal of Function Spaces*, vol. 2022, Article ID 7425196, 11 pages, 2022.

Research Article

Mathematical Modeling and Simulation of Online Teaching Effect Evaluation Based on Decision Tree Algorithm

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Received 27 May 2022; Revised 18 July 2022; Accepted 25 July 2022; Published 8 August 2022

Academic Editor: Miaochoao Chen

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With the support of big data technology, the field of education is also facing new problems and opportunities. Network teaching has become the mainstream means of higher education. In order to explore the changes of students' learning effect in the process of online teaching, this paper proposes to build an online teaching effect evaluation model with the support of data mining technology and decision tree algorithm. This paper records the factors and objects that reflect the teaching effect in network teaching and traditional teaching, respectively. A decision tree algorithm is used to divide the attributes of influencing factors from relevant rules. Using the Kirschner model to build the evaluation system, add two attribute elements: students' teaching evaluation and teachers' self-evaluation. Data mining technology is used to preprocess and clean up the sample set, which improves the accuracy of the calculation results. In the evaluation model, the association rule algorithm is also constructed to classify the data of the same element type and delete the data of different elements after marking. Through this evaluation model, teachers can accurately judge students' learning interests and improve students' academic performance. The results show that compared with the traditional data mining algorithm, the decision tree algorithm has obvious advantages in computing speed and accuracy.

1. Introduction

There is an obvious gap between online teaching and traditional teaching methods. It has the characteristics of diversity, flexibility, and interaction [1]. According to different disciplines, choosing various forms of teaching can achieve the purpose of solving students' after-school problems anytime and anywhere. Teachers' choice of teaching methods also needs to refer to teaching needs, teaching objectives, online platform stability, and other factors [2]. Compared with traditional classroom, online classroom also includes check-in, in-class test, live broadcast time, homework release, and other forms. The main elements of network teaching mode are teachers, students, teaching content, teaching media, supporting platform for teaching and learning, etc. Teachers choose the teaching content according to the requirements of the syllabus, the characteristics of students, and the cognitive basis of students. Then, design and compile into multimedia teaching software and network courseware or design and develop into network courses and

publish them to the course center [3]. The corresponding data generated during students' online learning can also be collected through the teaching platform. How teachers use behavior data to form accurate and effective effect evaluation is the main content of our exploration [4]. At present, online teaching modes include Tencent conference, Mu class live broadcast, and nail class; this kind of video and audio live broadcast can enable students to acquire and share knowledge in the family environment. Due to the full implementation of the network education model in colleges and universities, teaching resources also have richer choices [5]. The popularization and development of online teaching mode is one of the ways for colleges and universities to display modern educational technology means. It also brings new ideas for the improvement of classroom environment and teaching quality management. Teaching effect evaluation is one of the links of teaching quality management and supervision, which can ensure the effectiveness of teaching methods [6]. Whether the teaching effect is perfect needs to be further reflected in the evaluation indicators [7].

How to evaluate and test the effect of online teaching objectively and fairly is the main concern of college educators all over the world [8]. The various attributes of evaluation indicators can directly affect teachers' planning of teaching mode and the way of carrying out teaching activities. Although a relatively complete teaching effect evaluation system has been established in the traditional teaching classroom, due to the unique form of online teaching, it is necessary to reconstruct an online teaching effect evaluation system [9]. According to the survey, the acquisition process of online teaching effect evaluation has the following problems: first, there are many online teaching modes, resulting in different judgment standards for teaching effect [10]. Many colleges and universities do not have a deep understanding of the online teaching mode and still use the traditional classroom evaluation indicators, resulting in the evaluation coefficient which cannot be objective and fair. Second, online teaching has distinct characteristics, and the evaluation of teaching effect must meet the elements of online teaching [11]. Third, the concept of teaching effect evaluation is vague, the evaluation angle is single, and the evaluation standard is single. There are still one-sided levels of teachers' evaluation views, ignoring the main function of students in teaching effect evaluation [12]. According to the above situation, this paper studies the online teaching effect by using the mathematical methods such as decision tree algorithm and Coriolis model in data mining technology, so as to realize the construction of teaching effect evaluation model.

2. Application Status of Data Mining Technology at Home and Abroad

With the development of educational modernization, the field of education has updated teaching aids and teaching means in combination with computer intelligence technology [13]. The development speed of artificial intelligence technology in the field of education will be significantly improved in the future. I believe that with the landing and application of 5g communication technology, the application scenarios of artificial intelligence technology will be gradually improved, and a large number of products based on artificial intelligence technology will be gradually implemented, such as the application of AR and VR products, which will open up a huge value space for artificial intelligence technology. People's understanding of the way of education has gradually changed. Modern information technologies such as Internet, big data, and artificial intelligence are changing people's living habits and learning styles [14]. The data generated in the teaching process of colleges and universities will be stored in the information database. These data can provide teachers with students' learning status and performance change trend [15]. However, how to quickly query information and calculate and count data sources is the primary problem perplexing educators. As a multidisciplinary research technology, data mining was officially proposed at the first academic conference in Canada [16]. Subsequently, this technology has been widely used in the fields of medicine, pedagogy, and economics and

achieved good results. They began to pay attention to the application of data mining technology in the field of e-learning. According to data mining technology, the real-time path of computer software in application is analyzed to mine system vulnerabilities and execution records [17].

Japan's modern industry needs to deal with massive data information in the big data environment [18]. In order to improve the retrieval speed and accuracy, they use data mining technology to improve the analysis quality in the economic field and make a scientific transformation of enterprise finance [19]. The application of this technology in financial management is highly feasible, and some research results have been obtained. The German construction team is characterized by complexity in its work. This kind of specialized work has great difficulty and error in practical operation [20]. In order to improve the quality of construction projects, they use big data mining technology to detect the construction quality. Data collection and pre-treatment shall be carried out in the project development stage, and a certain logical process shall be adopted to analyze whether the construction quality meets the standard. Finally, the purpose of optimizing building quality and building process structure is realized [21].

As a common method in data mining, a decision tree algorithm has been widely used in the field of education in China [22]. The decision tree algorithm has been used in student grade point analysis, behavior data analysis, and so on. Through the data feedback information, we can judge the enrollment proportion and predict the employment situation of students. The decision tree algorithm can also get the following results in the process of analyzing the changes of students' grades: students' age, gender, learning time, and discipline basic ability [23]. According to the main factors affecting students' performance, the corresponding performance prediction model is generated. Through the improvement from generation to generation, the decision tree algorithm can also realize the early warning processing of students' performance from the specific factors affecting students' learning behavior in the relationship rules and classification rules [24]. In the field of education, foreign countries have also taken a series of research on decision tree algorithm. They not only applied this algorithm to student performance monitoring but also analyzed the investment of education funds and student information management [25]. Obtain students' favorite subject data from the big data environment, and then cultivate students' learning habits. Using the association rules in the decision tree algorithm can also accurately judge the enrollment rate, enrollment rate, and transfer rate of students in different regions, so as to realize the allocation and planning of educational resources. Based on the above research status, this paper also uses the decision tree algorithm to build and study the model of online teaching effect evaluation.

3. Analysis of Evaluation Model Construction

3.1. Research on the Construction of Online Teaching Effect Simulation Model Based on Decision Tree Algorithm. In today's college education process, students' learning effect

and teachers' teaching effect have become important indicators affecting students' performance. One can directly reflect teachers' teaching level, and the other can objectively reflect students' learning ability. It has a guiding function for teachers to choose teaching methods and schools to plan teaching plans. At present, online education platforms emerge one after another, and online teaching has become a widely used way in teaching mode. With the support of data mining technology, this paper uses decision tree association rule algorithm to build its simulation model and form an evaluation system for online teaching. So as to realize the detection and improvement of students' learning effect. According to various influencing factors, this paper analyzes the change trend of students' performance and then puts forward reasonable targeted suggestions to improve the teaching quality. As a widely used classification algorithm in data mining technology, the decision tree algorithm can get the hidden information contained in the data through data analysis and preprocessing. These information can be divided into effective and ineffective functions. Further processing can summarize the factors affecting the calculation results. For the teaching effect, the use of data mining and classification is helpful to understand the shortcomings of the teaching model, improve their own advantages, and clarify the defects in the teaching methods. For college teachers, it can help teachers adjust teaching methods, change teaching plans, and formulate educational plans for students' learning effects. At the same time, it can also improve their own teaching level and optimize teachers' teaching skills in the teaching effect. The focus of higher education is to improve teaching quality and cultivate compound talents with high quality and strong comprehensive ability for the society. As an important basis to measure the quality of teaching, students' performance is also an important symbol to evaluate students' mastery of knowledge and learning attitude. Therefore, the prediction and analysis of students' scores can provide an important basis for teaching managers to deepen teaching reform, reasonably arrange teaching plans, and improve teaching quality. With the rapid growth of student performance data, it is difficult for teachers to find rules directly according to the distribution of student performance and make decisions according to this rule. The traditional analysis and treatment of students' performance by teachers are generally only to count the number of students whose performance is at the level of excellent, good, average, and poor. However, it is impossible to understand the reasons for the distribution of students' achievements. If teachers can fully understand the reasons for students' achievements, they will be able to better "suit the remedy to the case" and improve the teaching quality. For the massive data generated in the teaching process, in the past, only the primary data backup, query, and simple statistical stages were used, so these data were not fully utilized. Now, we can use data mining classification technology to transform a large amount of data into classification rules, so as to better analyze these data and obtain useful information.

Firstly, this paper refers to a large number of literature and analyzes the difference between traditional teaching effect and online teaching effect. It is found that the final

score and process detection of students' learning can reflect the effect of online teaching. Because the student achievement information belongs to discrete data, the classification rule algorithm in the decision tree algorithm is selected as the technical support. This paper analyzes the main factors affecting teaching effect and students' achievement from various angles. The whole research idea is shown in Figure 1.

It can be seen from Figure 1 that after determining the research object and method, it is also necessary to sort out and collect the data. We mainly collect objective factors such as online teaching platform, students' age, gender, teachers' teaching level, and teachers' rank. Among the research objects, a university was randomly selected for online teaching, and a questionnaire survey was conducted on students and teachers. A total of 8000 valid survey results were recovered. According to the survey results, there are obvious differences in teachers' choice of online platforms and teaching methods. We show the way of online teaching in terms of data and proportion, as shown in Figure 2.

As can be seen from Figure 2, more than half of college teachers have overlapping and mixed behaviors in choosing online teaching methods. More than 20% of teachers use the three teaching methods. Most teachers make their own teaching contents and resources, and a small number of teachers choose the teaching resources provided by the Mu class platform. According to the above survey results, we will calculate the collected data by decision tree algorithm to judge the impact of the above factors on the effect of online teaching. The decision tree algorithm can classify and sort the irregular events to form the corresponding mathematical model and use the classification rules to predict and analyze the hidden data. The decision tree algorithm can solve both classification problems (the corresponding target values are classified data) and regression problems (the output results can also be continuous values). Compared with other algorithms, decision tree has a very obvious advantage; that is, it can be visualized intuitively. Each leaf node under the tree structure is given a flag to record the tree conditions contained therein separately. This arrangement from top to bottom can achieve the purpose of classification after data preprocessing in practical research. Three classes of modern education technology are randomly selected as the representative objects of this paper. There are one professor and three lecturers among the teachers, and a total of 5423 data are generated. Establish a data summary table for the basic information of students from the perspectives of name, gender, student number, and major. In the judgment of teaching effect, the change of students' academic performance is selected as a reference. Compare the performance changes of students in the three classes, as shown in Figure 3.

As can be seen from Figure 3, the number of students in the first class is large, and the average academic performance is relatively uniform. The number of students in the third class is small, of which the number of male students accounts for two-thirds, and the academic performance is high. Before establishing the decision tree model, the data needs to be discretized and split. Discrete processing is for data induction to form a small range of characterization attributes. Remove the data irrelevant to the influencing

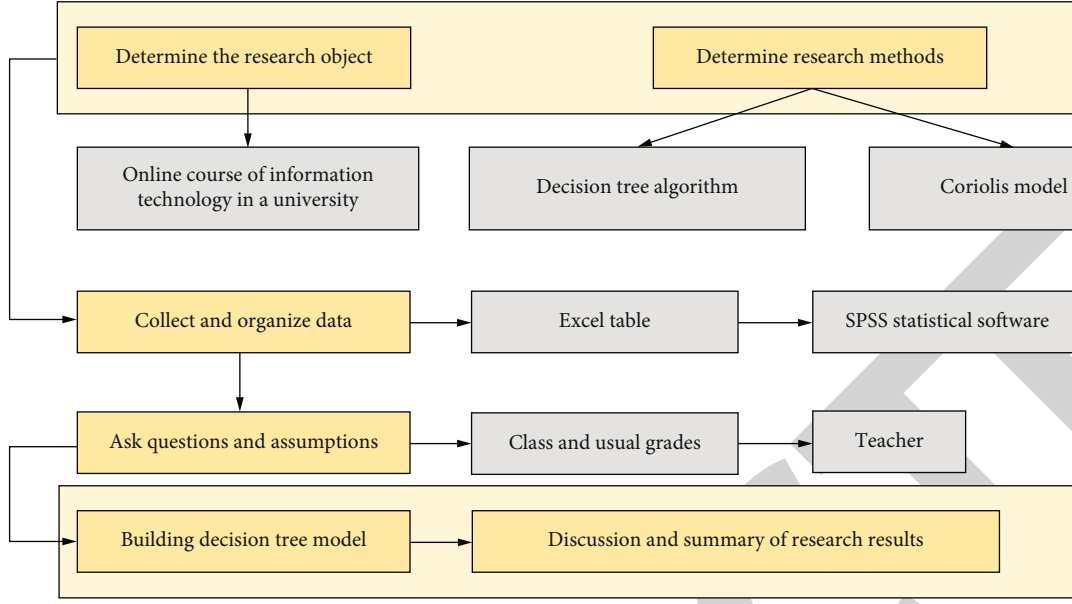


FIGURE 1: Flow chart of research ideas.

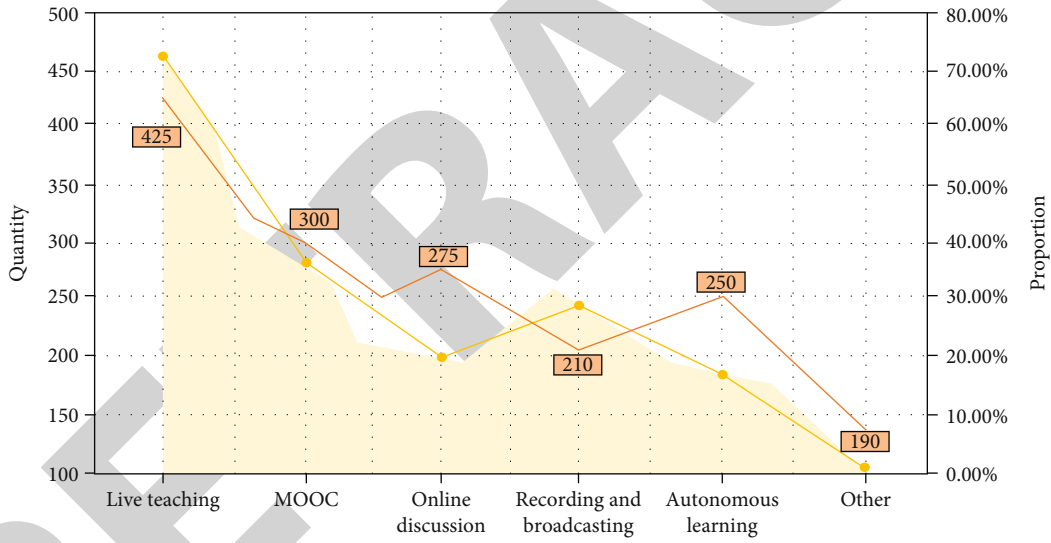


FIGURE 2: Display diagram of data change and proportion change of online teaching mode.

factors, and retain the effective information. Suppose a sample set has different representation values in training, which can be distinguished according to discrete values and ordinary values. The outputs corresponding to these calculation results can form multiple subsets. At this time, the data quotient measurement is calculated according to the subset information:

$$\text{InfoA}(D) = \sum_{j=1}^v \frac{|D_j|}{|D|} \times \text{Info}(D_j). \quad (1)$$

The weight changes in each partition can be divided according to the category. When the effective expected data in the tuple is smaller and smaller, the accuracy of the whole partition is higher. The definition of data quotient value

should also be combined with the difference of information demand:

$$\text{Gain}(A) = \text{Info}(D) - \text{InfoA}(D). \quad (2)$$

The classification data used in the decision tree algorithm is similar to the variable $\text{Info}(D)$, and its operation formula is

$$\text{SplitInfoA}(D) = - \sum_{j=1}^v \frac{|D_j|}{|D|} \times \log_2 \left(\frac{|D_j|}{|D|} \right). \quad (3)$$

The calculated data values are divided into corresponding attribute areas by the set. At the same time, the output

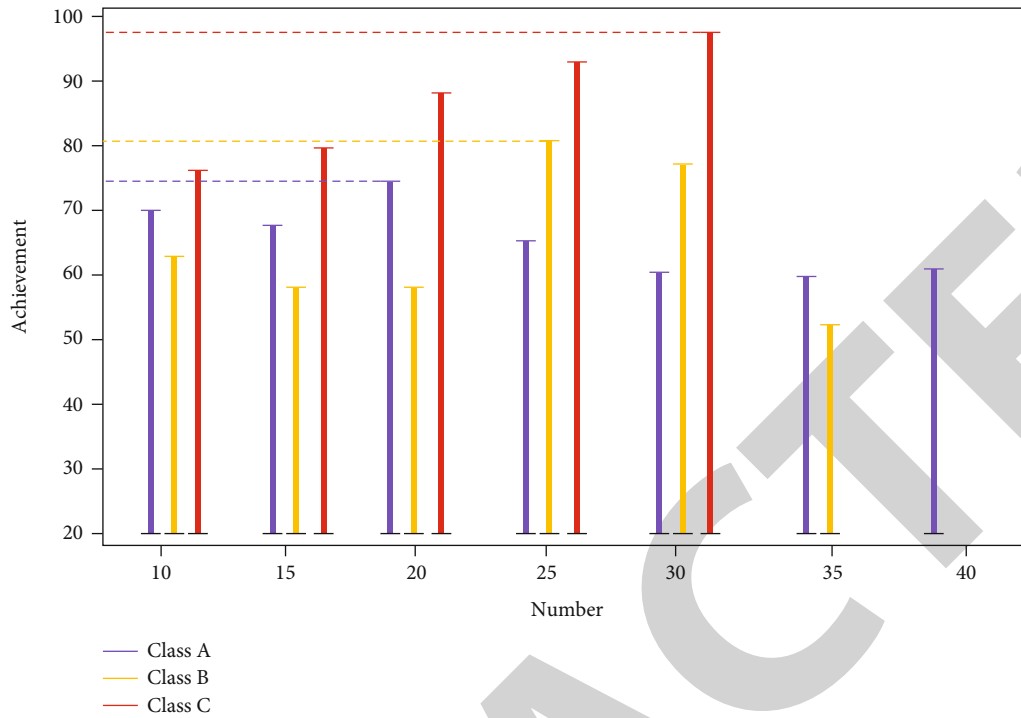


FIGURE 3: Student achievement change chart of three classes.

variables of the calculation results are compared. The whole comparison formula is as follows:

$$\text{Gainratio}(A) = \frac{\text{Gain}A}{\text{SplitInfo}A(D)}. \quad (4)$$

According to the above formula, students' usual test scores and final test scores are constructed. To determine whether the students are qualified or not, they need to be sorted into two grades, and the data quotient value is calculated by using the classification formula:

$$\text{Info}(D) = -\frac{534}{1096} \times \log_2 \frac{534}{1096} - \frac{562}{1096} \times \log_2 \frac{562}{1096} = 0.9995. \quad (5)$$

The above formula includes sample quantity and effective data quantity. Students' grades are divided into three grades: excellent, good, and average. Among the three grades, there are 527 excellent samples above the average coefficient, 58 good samples, and only 3 general samples. We define the usual score formula:

$$\begin{aligned} \text{info}(p) &= \frac{858}{1096} \times \left(-\frac{527}{858} \times \log_2 \frac{527}{858} - \frac{282}{858} \times \log_2 \frac{282}{858} \right) \\ &= 0.9623. \end{aligned} \quad (6)$$

Classify the data of usual performance:

$$\begin{aligned} \text{Split info}(p) &= -\left(\frac{858}{1096} \times \log_2 \frac{858}{1096} + \frac{282}{1096} \times \log_2 \frac{282}{1096} \right) \\ &= 0.8631. \end{aligned} \quad (7)$$

We take the test results of students' online teaching as test data and maximize the selection of each attribute according to the decision tree model. The test score is the root node of the decision tree model, so as to further determine each child node. The final decision tree model is as follows:

As can be seen from Figure 4, three branches are generated under the root node, which are the summary results of usual grades in online teaching. Excellent, good, and general are used as the data sources of the three branch nodes. Finally, the decision tree model needs to be further simplified. This pruning method adopts the operation of deleting after a long time. Eliminate the data without research value to make the model calculation more simple and convenient. From the above research, it is concluded that the online teaching effect has obvious advantages over the traditional teaching effect. With the increase of the number of students, the range of excellent students is gradually expanded, and ordinary students account for the vast majority of the sample set. Next, we need to build an evaluation model for the effect of online teaching.

3.2. Application Analysis of Network Teaching Effect Evaluation Model. With the more and more frequent

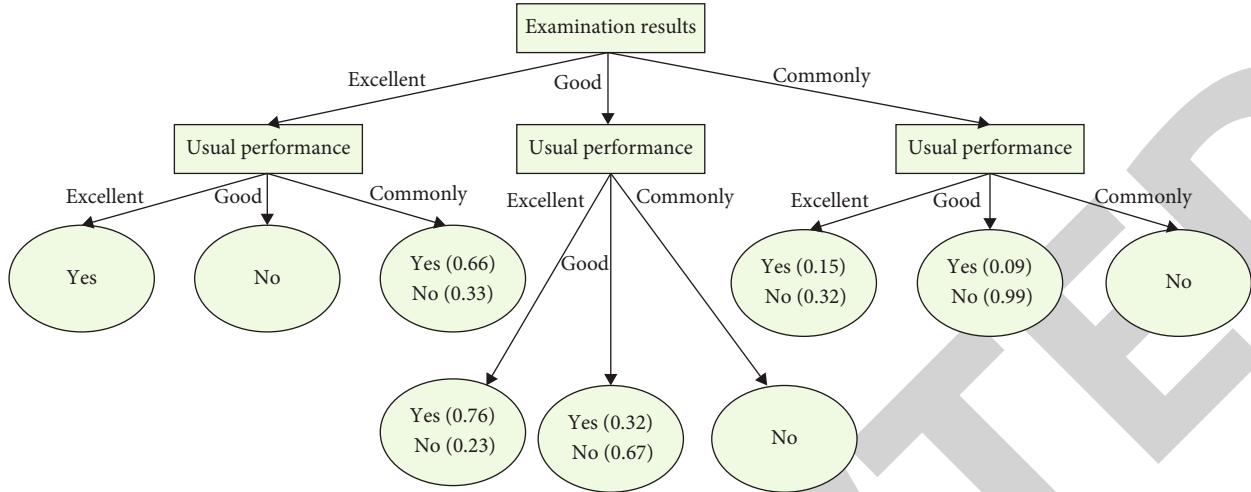


FIGURE 4: Decision tree model.

application of data mining technology in college teaching activities, we should rejudge the impact of teaching effect on students' learning activities in the face of online teaching mode. The new teaching mode brings new challenges to the evaluation of teaching effect. Teachers' analysis of teaching effect is the main means to ensure teaching quality and improve teaching efficiency. Whether the evaluation mechanism is reasonable and the evaluation index is accurate is one of the various factors affecting the effect evaluation. At present, most colleges and universities do not fully understand the online teaching methods, and the evaluation angle is relatively single, which is quite different from the actual teaching process. Data mining technology records the learning situation and learning trajectory of different users in the database. The sequential pattern mining method of data mining is used to classify documents. Improve the speed of students' information retrieval. Teachers can conduct mining and analysis based on the data accessed by students. Cluster analysis of the access data, understand the contents of students' interest and the relationship between access sites, and analyze students' access habits and interests. Actively push some interesting content to them, and set up hyperlinks between related pages to improve the structure of the website. Make the links between pages more in line with students' visiting habits. Facing the shortcomings of online teaching effect evaluation, this paper constructs and studies the online teaching effect evaluation index by using the decision tree algorithm and Coriolis model structure. The whole evaluation process is shown in Figure 5.

As can be seen from Figure 5, the evaluation system has two parts: process and summary. After many online teaching environment simulations, record the generated student data. Classify and summarize the data set to reflect the teaching effect and operation. It can reflect the actual learning effect of students from the aspects of class rate, learning time, and performance change. Traditional evaluation methods generally use numerical calculation, including equal difference calculation method, similar estimation method, and weighted average method. However, in the face of a large

amount of data generated by the online platform, the above methods cannot guarantee the accuracy of the calculation results. Before building the decision tree model, this paper needs to traverse the two variables of quotient value. The feature of numerical maximization is selected as the best tree node. After importing the data, conduct digital conversion to convert the characteristic information into dictionary form. The code formula is as follows:

$$\begin{aligned}
 x &= x.to_dict(\text{orient} = \text{"records"}), \\
 \text{transfer} &= \text{DictVectorizer}(), \\
 x &= \text{transfer.fit_transform}(x).
 \end{aligned} \tag{8}$$

When designing the decision tree model, first define the number of node layers:

$$\text{estimator} = \text{DecisionTreeClass} = \text{max_depth} = 3. \tag{9}$$

Call the compound function to the training model, input the characteristic variables and mark them as the best child nodes. Finally, it is combined with the output characteristics to form tree parameters:

$$\text{estimator.fit}(x, y). \tag{10}$$

There are no regular and repeated paths for the above operations, and users cannot find the regular characteristics of data processing. This can greatly ensure the security and effectiveness of data. It can be seen from the decision tree node that the data on the left side of the object represents the samples with high trust and the data on the right side represents the samples with low trust. Starting from the second level, the subnode with a value of indicates the state of low teaching evaluation. We apply the same data to the traditional data processing methods and compare the results from the accuracy, as shown in Figure 6:

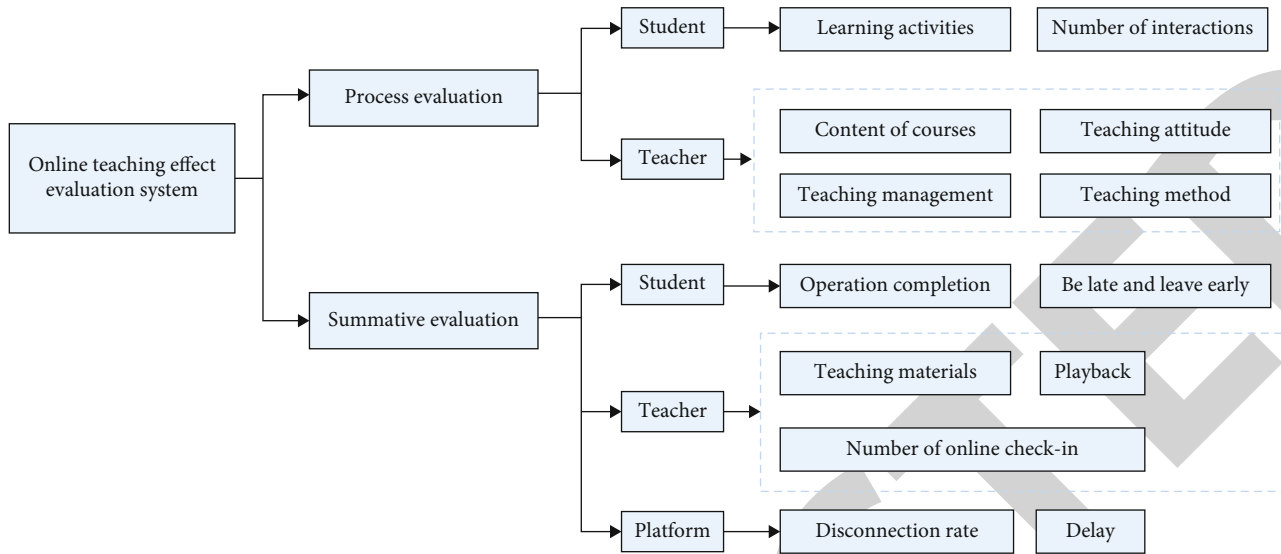


FIGURE 5: Flow chart of the whole evaluation.

It can be seen from Figure 6 that there is little difference between the traditional method and the decision tree algorithm in the initial stage. With the gradual increase of the number of samples, the accuracy of the traditional method shows a cliff decline, while the decision tree algorithm can still maintain high accuracy. Finally, we use Coriolis model to evaluate the prediction effect. This model is mainly composed of reaction group, behavior group, learning group, and result group. The response group includes students' feelings about online teaching, which is mainly used to collect students' feedback on the teaching mode. The behavior group is to judge the status and behavior characteristics of students' online learning, as well as the mastery of each subject's knowledge and skills. The learning group is a comprehensive collection of learning effects, which can represent the effect of online teaching to a certain extent. The final result group can judge whether students fully master knowledge and skills and whether they can use online course content to solve problems in daily life. Teachers need to strengthen interaction. Online teaching must focus on interaction. In the process of interaction, teachers can also have a general understanding of students' learning, so as to determine the next teaching plan. At the same time, pay attention to online assessment. Online assessment is often one of the most important ways for teachers to grasp students' learning. Investigate the student data, respectively, to form the teaching effect evaluation index, and use the analysis and calculation ability to obtain the proportion of each index. Assuming that the coefficient gain of each index can be determined, the attribute of maximum coefficient increment can be obtained by comparing their size in the overall structure. Assuming that the sample set has unknown values, define similar sets as expected information:

$$I(S_1, S_2, \dots, S_m) = - \sum_{i=1}^m p_i \log_2(p_i) \quad (11)$$

Among them, the similar set is $C(i = 1, 2, \dots, m)$. The probability formula of any sample belonging to the set is

$$p_i = \frac{s_i}{s}. \quad (12)$$

It is assumed that subsets with different values of attributes can be represented by similar variables. The data in S_j is divided into output variables by the total set:

$$E(A) = \sum_{j=1}^v \frac{(s_{1j} + s_{2j} + \dots + s_{mj})}{s \times I(s_{1j}, s_{2j}, \dots, s_{mj})}. \quad (13)$$

The smaller the calculated value, the higher the information purity in the representative model. This highly accurate subset data can reflect that the evaluation index of teaching effect is dynamic and effective. According to the calculation results, the online teaching mode is evaluated from the perspective of students. The whole student group has a high acceptance of online teaching methods, and the mastery of learning knowledge in the survey has also achieved the expected results. In order to more comprehensively evaluate the effect of online teaching, we need to supplement the evaluation and suggestions obtained from the perspective of teachers.

4. Research Results of Evaluation Model and Analysis of Influencing Factors

This paper randomly selects a university to conduct a simulation experiment on its online teaching courses. A large number of sample data were obtained in the study, including the main characteristics of students' gender, age, teacher education, and teacher age. In order to explore the effectiveness of online teaching effect evaluation model, we need to analyze the influencing factors from multiple angles. The collected student evaluation forms basically reflecting that

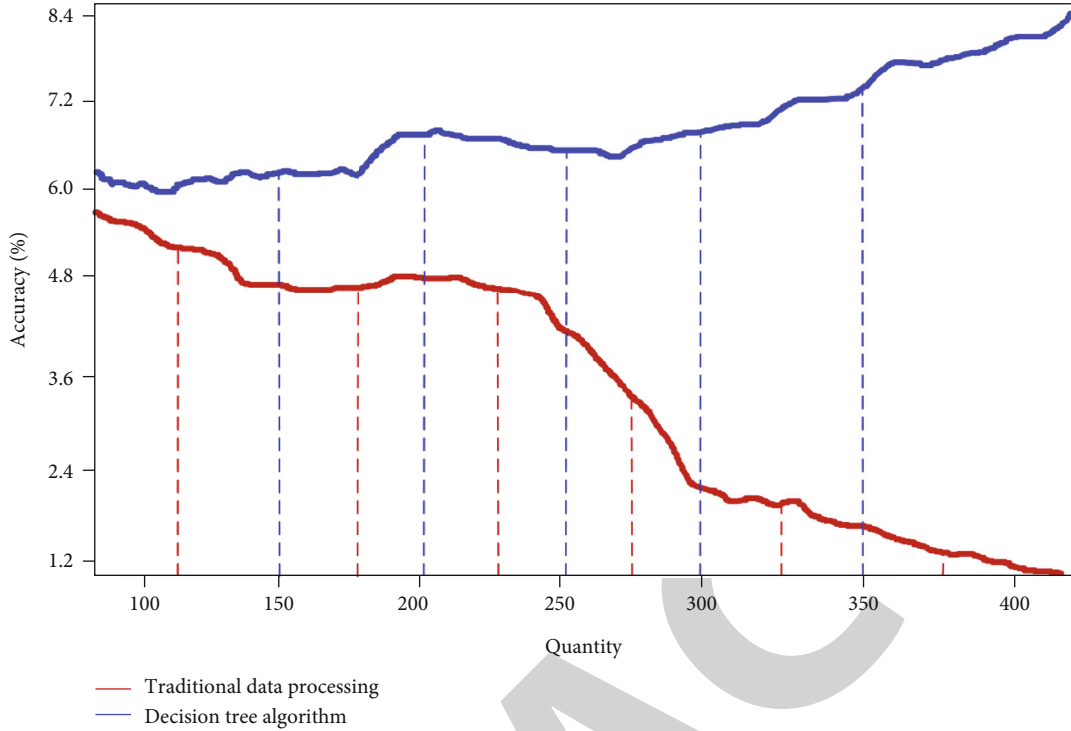


FIGURE 6: Accuracy comparison between traditional method and decision tree algorithm.

TABLE 1: Student evaluation information form.

Full name	Number of participants	Average	Total score	Teacher age	Teacher education	Teacher gender
Baizhuohua	197	4.03	795.6	24	Undergraduate	Male
Wanghai Feng	165	5.42	895.9	26	Undergraduate	Female
Wangqianqian	35	2.92	102.3	28	Master	Male
Dongdaming	95	1.64	156.3	30	Master	Female
Zhangguoqiang	78	7.20	562.2	35	Doctor	Male
Lihua	40	12.12	485.6	37	Doctor	Female

the teaching methods are generally welcomed. In the follow-up, we should improve the whole effect evaluation model in combination with teachers' teaching evaluation and suggestions. The decision tree algorithm is used to preprocess the sample data. In the face of incomplete data and invalid data, the reference index needs to be set in advance. This way of setting indicators can improve the quality of data processing and finally achieve the purpose of improving the evaluation quality. The data we selected is from the 2020 student evaluation information table, which is stored in the database. After sorting the information table, it is expressed as follows.

As can be seen from Table 1, each student's evaluation of teachers is summarized. The table also includes teachers' names, ages, professional titles, and grades. Cleaning the above data can fill in the missing attributes and eliminate useless information. In the summary table, some teachers' professional title grade attribute is empty, so we use cleaning to delete the record. Finally, the online teaching effect evaluation system is constructed. The main functional blocks and system pages are shown in Figure 7:

As can be seen from Figure 7, the system functions include query, management of student files, management of teacher files, class opening, course schedule viewing, after-school homework management, course evaluation, and other modules. And randomly display a student's evaluation page of the course. After the simulation forms the evaluation system, it is also necessary to analyze the factors affecting the teaching effect.

The discrete data attributes processed by decision tree algorithm include peacetime score, final score, and class. In addition to combining students' evaluation of teaching, we also make a statistical analysis of students' learning effect. The lowest score is 50, and the highest score is 100. We plan 15 points into one stage, and the number of middle school students in each stage is not fixed. From 50 to 65 points are the general stage, from 65 to 80 points are the good stage, and above 80 points are the excellent stage. Combined with the research object, the students' usual performance data includes two characteristics: continuous and discrete. In the calculation, due to the difference of data types, it is easy

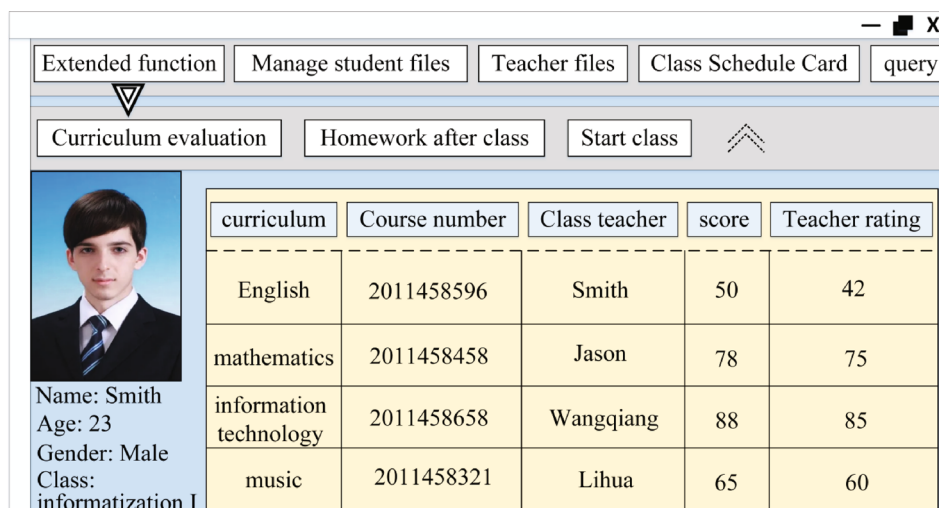


FIGURE 7: Main functional blocks and system page diagram.

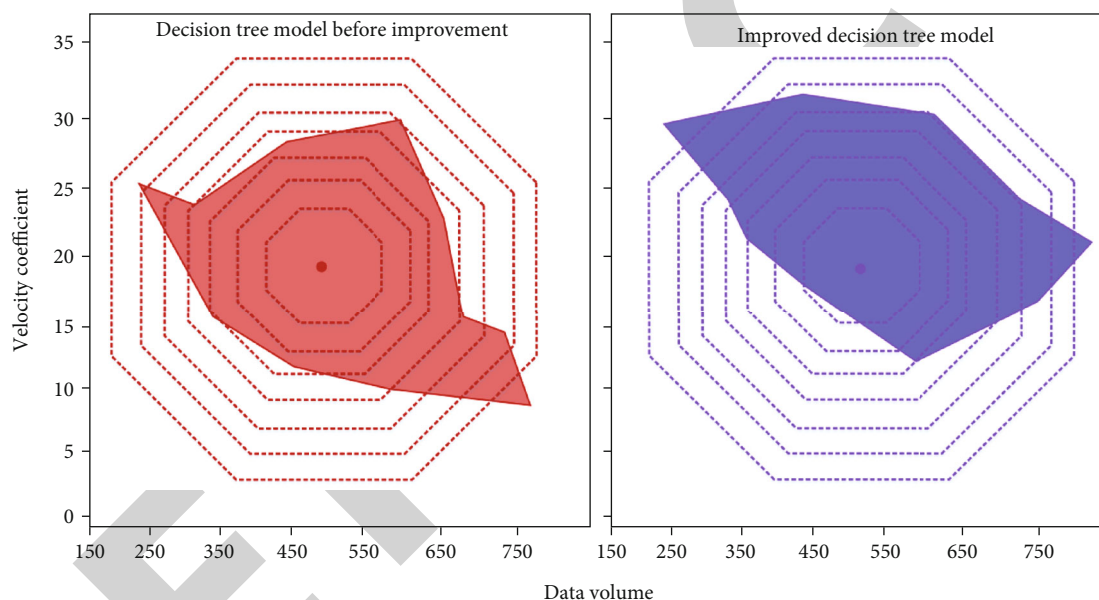


FIGURE 8: The change of speed range of decision tree model in data processing before and after improvement.

to take a higher value. Based on this situation, we choose to use the decision tree algorithm to improve the calculation. In the improved algorithm, the function of association rules is used to find out the object relationship in the data set, and the prediction model can be verified when using student data to predict the evaluation of teaching effect. Compare the speed range changes of the decision tree model before and after improvement in data processing, as shown in Figure 8.

As can be seen from Figure 8, the data set traversed by the correlation algorithm can eliminate the interference of miscellaneous data, and each predictable sequence can be automatically classified according to the set threshold in the search for simultaneous cases. Therefore, the improved decision tree algorithm improves the speed and processing range of the prediction model.

Finally, in the teaching evaluation and prediction system, we automatically generate each student's usual score report,

and the score index is displayed as a normal distribution according to the data uploaded in the above three stages. Among them, the length of learning, online teaching platform, and teachers' education are the main influencing factors. Students in three stages are investigated, as shown in Figure 9.

As can be seen from Figure 9, most of the students who have studied for a long time are in the excellent stage, and a few are in the general stage. When the online teaching platform is mu class network and learning link platform, students' learning effect is good. When the teacher's degree is a master's degree, the student's performance rises rapidly. According to the analysis of the above research results, the online teaching effect is finally presented as the usual score and the ultimate test score. The professional grade, educational background, age, and other factors of subject teachers have the second largest impact on students' learning effect.

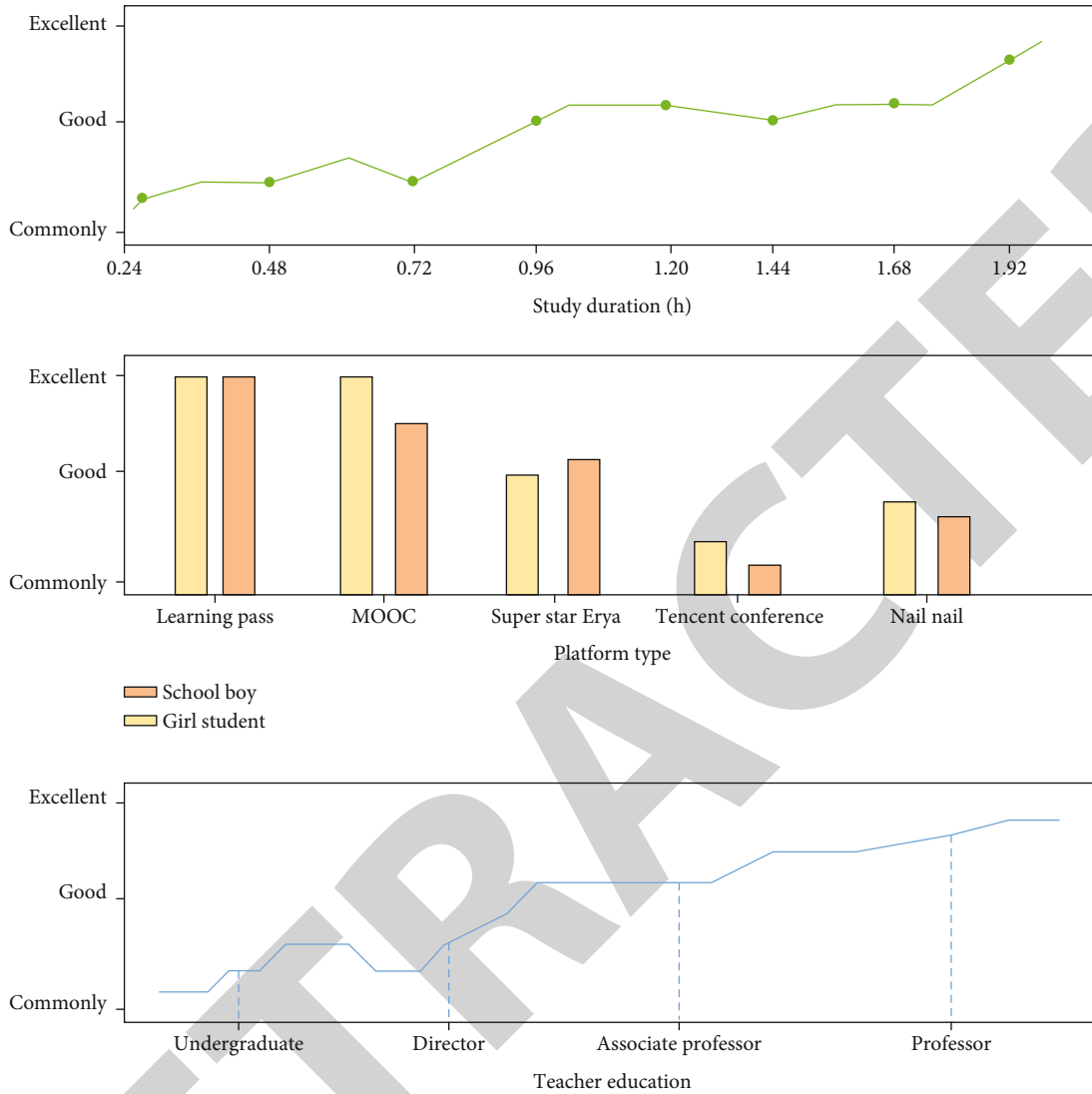


FIGURE 9: The impact of learning time, online teaching platform, and teachers' academic qualifications on students' evaluation.

When the professional grade of teachers is higher, the effect of students' online learning is better. At this time, the more important influencing factors of students' attributes are sorted according to age, discipline nature, and class collective. Students in the excellent stage provide more data in the teaching effect evaluation form. They actively cooperate with teachers in teaching research according to their own learning state. Teachers need to understand the actual needs of teaching and students' learning needs, improve teaching interaction, and promote the transformation of curriculum knowledge. Colleagues who strengthen teaching skills should also enrich their professional abilities, timely cater to modern teaching ideas and improve teaching methods.

5. Conclusion

Under the background of big data environment and computer, modern technology has a greater and greater impact on people's life. Big data technology has achieved effective combination and application in various fields. Among them,

the field of education is also facing new problems and opportunities with the support of big data technology. Online teaching mode is one of the topics frequently studied and investigated by scholars all over the world in recent years. Compared with traditional teaching, online teaching has the advantages of convenience, simplicity, and high interactivity. In order to explore the changes of students' learning effect in the process of online teaching, this paper proposes to build a model for online teaching effect evaluation with the support of data mining technology and decision tree algorithm. Firstly, the decision tree algorithm is used to divide the attributes of influencing factors from relevant rules. Record the factors and objects that reflect the teaching effect in online teaching and traditional teaching, respectively. Secondly, data mining technology is used to preprocess and clear the sample set to improve the accuracy of calculation results. Finally, the Kirschner model is used to construct the evaluation system, adding two attribute elements: students' evaluation of teaching and teachers' self-evaluation. In the evaluation model, the association rule

algorithm is also constructed to classify the data with the same element type and delete the data with different elements after marking. The results show that the decision tree algorithm has obvious advantages in computing speed and accuracy compared with the traditional data mining algorithm. The collective online teaching evaluation system with better students' scores provides more data. Most students learn well in the online teaching mode. However, this paper still does not solve the problem of data mobile phones caused by algorithm problems. The decision boundary generated by the decision tree is horizontal and vertical. If the distribution of data sets is skewed, the use of decision trees may not be able to well reflect the distribution of data sets. This needs further research in future research.

Data Availability

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

Conflicts of Interest

The author declares that there are no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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