



# The Application Study of Data Mining Technology in Education Management

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**Abstract.** The role of data mining technology in teaching management is very important, but there is a problem of low management level. In the past, the teaching management method could not solve the problem of management level in teaching management, and there were few management level indicators. Therefore, this paper proposes a data mining technique to construct a teaching management model. Firstly, data mining technology is used to analyze the management data of teaching management and manage the data according to teaching standards. Divide and reduce interference factors in the management level. Then, the data mining technology manages the teaching management content, forms the teaching management results, and continuously analyzes the management data. MATLAB simulation shows that under the condition of certain teaching management requirements, the management accuracy and analysis time of data mining technology are better than before Teaching Management Method.

**Keywords:** intelligence · technology · teaching management · Analysis

## 1 Introduction

In the era of big data, education big data has reversed the traditional backward education concept and thinking mode. In the new era, the field of education is full of information and data. The words and deeds of teachers and students and all kinds of things in schools can be transformed into information or data. With the widespread popularity of intelligent equipment, every student can use computers for terminal learning, which can help improve students' learning enthusiasm and also help students use fragmented time for efficient learning [1]. It can be seen that big data is more meaningful and valuable than traditional digital teaching. For example, in the traditional examination, the paper test paper is used to evaluate the students' learning situation in the recent stage. The score of the test paper is only a simple traditional number. If you change the way of thinking and treat the number as data, you can find out all kinds of information hidden behind the number. For example, which option did the students choose for the score of each question? How long did you spend on each option? Have you modified the answer? Are there any jumps when doing questions? When will the inspection be carried out?

When will you finish the exam? Through data analysis, it is helpful to understand the students' recent learning situation and their way of thinking. This score is far more valuable than the score of the paper test paper. Whether in the classroom or in the exam, infiltration of big data through teacher-student interaction can help improve classroom teaching efficiency and also update teachers' educational concepts. In the traditional education process, it is mainly teachers and education authorities who effectively extend the classroom content with their teaching materials based on teaching experience, but some learning experience is not scientific, and even some common sense of experience will affect teachers' judgment. In the era of big data, the analysis of education data helps to mine the writing materials and learning content, effectively mine the teaching information according to the actual learning situation of students and the content of teaching materials, and formulate targeted teaching plans through feedback evaluation, so as to achieve targeted teaching and effectively improve the quality and efficiency of education and teaching.

Big data can realize personalized education, from group education to individual education. Using big data technology, teachers can focus on understanding the subtle performance of students, such as when students will read books actively, when they will feel happy to hear what they say, and when they will make mistakes in class... The generation of data is process, including students' autonomous learning process, classroom teaching process, and teacher-student interaction process. Through the reflection and recording of immediate sexual behavior, the effective integration of data is strengthened to further elaborate the learning status and performance level of students in the teaching process. The observation technology and equipment can be used to collect data without affecting students' daily life and learning. The data collection is very natural and real, and the real performance of students can also be obtained. Big data technology can provide teachers with real personality and student characteristics [4]. Teachers can also carry out teaching according to their aptitude in a targeted way. In the course of course explanation, students can focus on the part that students pay attention to and the basic part. Students can also be recommended to complete the exercises in which areas or read which kinds of books. After completing the homework assigned by the teacher, students can use big data information technology to effectively strengthen the analysis. When students do homework on electronic equipment after class, they can skip similar topics. If similar topics make mistakes, they can carry out multiple reinforcement to improve the efficiency of autonomous learning, and also enhance the application efficiency of fragmented time to reduce the learning pressure of students.

The use of big data technology in teaching evaluation can enrich the evaluation content, methods and channels and help improve the efficiency of teaching activities. In the traditional teaching evaluation process, the teacher only based on a paper or ordinary experience. This evaluation method is too simple, and it is difficult to improve the enthusiasm of students. Students can only passively wait for the evaluation. In the era of big data, teachers can use big data technology to summarize students' daily learning data, find out the rules of students' learning activities, and further optimize and innovate teaching content [3]. Through the Internet online platform, students' learning behavior records and learning guidance can be strengthened. The mouse click track of students

in the learning process can also be used to effectively query the teacher's online understanding of students' mastery of different knowledge points by using big data technology. How long did it take to do the problem? Which knowledge points need to be explained repeatedly? Applying big data technology to daily teaching activities can effectively analyze students' individual learning behavior, and also discover students' thoughts and dynamic changes. Using electronic textbooks or online learning platforms to understand students' homework, teacher-student interaction, classroom communication and other data, and collecting all kinds of information data at the end of the term can add rich materials and data basis, and can also effectively grasp students' learning and growth process and characteristics so as to provide reference data for students' future growth and development.

Teaching management analysis is one of the important management contents of college teaching, which is of great significance to teaching management. However, in the actual teaching management process, there is a problem of poor accuracy, which has a certain impact on the management of colleges and universities. Some scholars believe that the application of data mining technology to teaching management can effectively analyze teaching management [4]. On this basis, this paper proposes to modify the genetic method to optimize teaching management accuracy and verify the method's effectiveness.

## 2 Related Concepts

### 2.1 Mathematical Description of Data Mining Techniques

Data mining technology is to use dynamic theory to optimize management data, and according to the indicators in the management data [5], find outliers in teaching management results, integrate the corresponding management data [6], and finally judge teaching management Feasibility of the result. The modified genetic method combines the advantages of data mining technology, using management data to quantify the results of teaching management, which can improve the accuracy of analysis.

Hypothesis 1: The management data is  $d_i$ , the teaching set is  $set_i$ , the teaching indicator is  $y_i$ , and the education function is  $F(d_i \geq 0)$  as shown in Eq. (1).

$$F(d_i) = \sum x_i \cup y_i \cdot \xi \quad (1)$$

Although the content of imported information is extremely rich after data collection, some of it is useless information, such as whether to take an optional course, class schedule, etc., so you can eliminate this kind of garbage and useless information after importing. After data collection, the main work is to import data into the system for calculation, which is the process of system database establishment. In the process of importing student data, it is necessary to ensure that all student data are truly and accurately imported into the system [7]. Although some of the student's information is useless information, after the subsequent clustering rules and screening logic criteria are changed, some of the useless information can also be used as important parameters for clustering analysis. Here, because the system is in the research stage, some of the information is eliminated.

After data import, data preprocessing is required. The data preprocessing is also the most time-consuming part of the whole system, because some data needs to be converted from the original rules to data that conforms to the system's calculation rules. This step of preprocessing requires a lot of time and relatively high-end hardware support, especially in the face of a large number of student data.

After the data is imported, the data can be preprocessed. The course score of the imported data is a hundred-point system, so the range of clustering will be large in the later data processing and association rule processing [8]. Therefore, the hundred-point system will be converted into a ten-point system. The decimal system represents the whole digit of the student's achievement, and the case when then code is selected for implementation. This classification can make the students' clustering rules more representative, and effectively reduce the amount of data engineering in the process of building the clustering model.

## 2.2 Choice of Educational Programs

Hypothesis 2: The scheme selection function is  $z(d_i)$  and the weight coefficient is  $w_i$  [7], then the teaching scheme selection is shown in Eq. (2).

$$z(d_i) = \frac{z_i \cdot F(d_i, y_i)}{w_i \cdot \xi} + \quad (2)$$

Education management refers to the general term for the planned implementation of management activities for the educational objects under the guidance of certain educational objectives, following the management principles. Education and education management are different from each other, and are related to each other. The two are the relationship between generality and individuality. Education emphasizes the overall planning of individual people's thoughts, while education management highlights the practical approach in the process [9]. College student education management refers to the general term of various practical activities that focus on the advanced group of college students, and on the basis of insight into the ideological dynamics of college students, educators carry out in a planned way to promote the quality of college students according to their ideological characteristics. College student education management has the following three characteristics.

First, political orientation. The setting of management objectives needs to be guided by the correct political direction; the formulation of management plans needs to be guided by the correct political direction; The practice of management needs to be carried out closely around the correct political direction and unswervingly adhere to the correct political direction. In short, sticking to the correct political direction in college students' education and management is to strengthen the ideological status of socialist mainstream ideology in college students.

Second, strength integration. The realization of management objectives requires the integration of management forces. It is difficult to achieve the goal of college students' education and management only by relying on the role of one party. It is necessary to integrate the forces of all parties and give full play to the joint forces of education. On the one hand, we should give full play to the power of colleges and universities. For

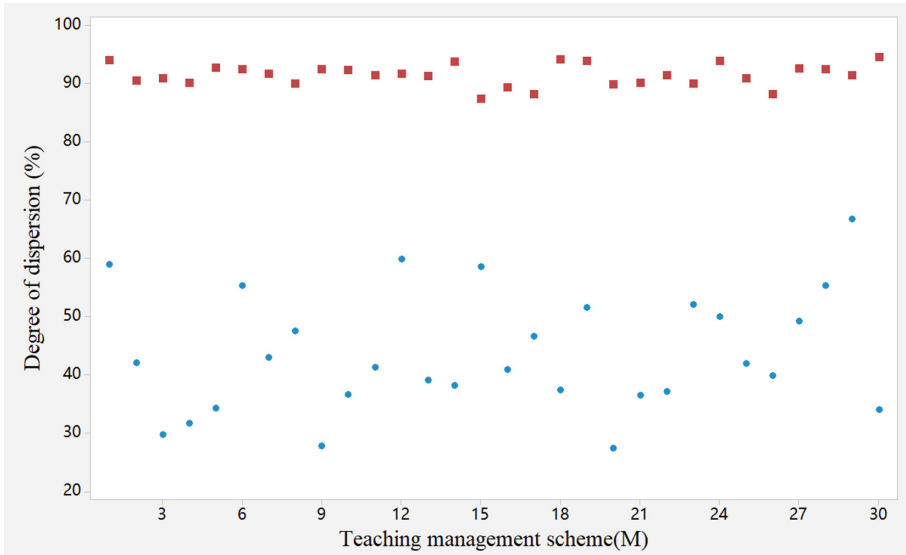
example, the main body of colleges and universities should integrate resources, inject human resources, material resources and other resources into college students' education and management activities, and help to achieve college students' education goals. On the other hand, we should give full play to the role of the state, society and universities. For example, the coordination between the state, society and universities should be strengthened [10]. The state should make good policy deployment and planning, and the society should create a good management environment. Universities should systematically manage on the basis of responding to the national policies, and form a management situation in which the three parties work together. We should integrate all forces to play the management effectiveness, achieve the management objectives, and help the precise management of college students' education.

Third, dynamic innovation. On the one hand, college students' thinking is constantly changing. As the most active group, college students' thinking consciousness is prone to change, which requires that education management should analyze college students' thinking from a dynamic perspective, and reasonably repair the management plan to ensure the dynamic effectiveness of management. On the other hand, the management environment changes dynamically. There are many factors involved in college students' education management, such as management subject, management object, information, time, and so on [11]. The change of any element will cause the overall change. To sum up, college students' education management is dynamic. In the process of grasping the dynamic, the management plan is constantly adjusted, and new management concepts and management technologies are needed in the face of change. The innovation of management is also constantly highlighted.

### 2.3 Management of the Processing of Data

Before the data mining technology, it is necessary to conduct discrete analysis of teaching management, map the management data into a two-dimensional plane, and eliminate abnormal management data. First, the management data is comprehensively analyzed, and the standards and index weights of the management data are set to ensure the accuracy of accounting data mining technology. Management data is system test management data and needs to be standardized. If the management data is properly distributed, its teaching management will be affected, reducing the accuracy of the analysis [12]. In order to improve the accuracy of accounting data mining technology and improve the level of teaching management analysis, the specific prediction scheme selection is shown in Fig. 1.

The survey management data shows that the teaching management scheme shows a discrete distribution, which is in line with the objective facts. The education program is not directional, indicating that the teaching management program has a strong randomness, so it is used as an analysis study of 8–12 weeks [13]. The education scheme meets the normal requirements, mainly because the data mining technology adjusts the education program, eliminates the duplicate and irrelevant schemes, and supplements the default scheme, so that the dynamic correlation of the entire management data is strong.



**Fig. 1.** Results of the selection of instructional management programs

### 3 Strategies for Instructional Management

Data mining technology adopts a random strategy for analysis and adjusts the corresponding parameters to optimize the analysis scheme. Data mining techniques divide the analysis into different periods and randomly select different strategies. In the iterative process, educational scenarios for different time periods are matched. After the matching process is completed, the level of teaching management analysis of different programs is compared to record the best teaching management.

## 4 Practical Cases of Teaching Management

### 4.1 Introduction to Teaching Management Data

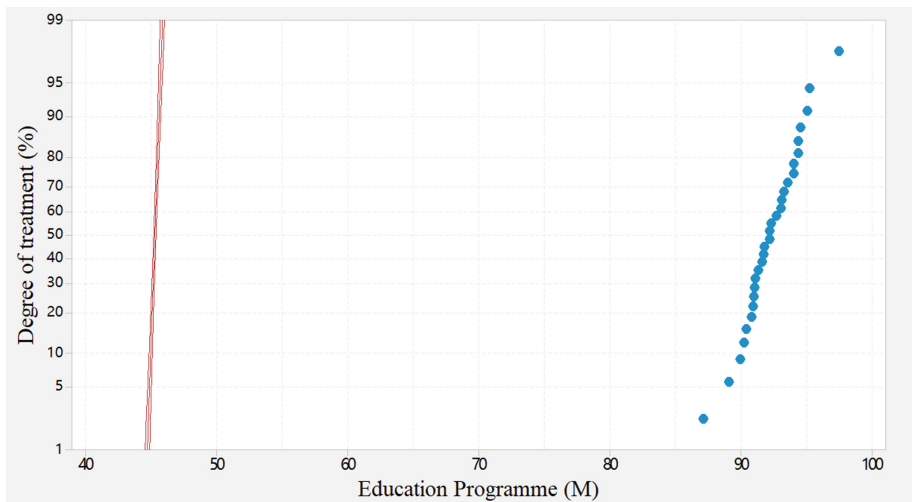
In order to facilitate the analysis, the management data in complex cases are the research object, 12 are accounted for, and the test time is 12 weeks, and the specific analysis management data is shown in Table 1.

The processing of instructional administration data in Table 1 is shown in Fig. 2.

Table 1 shows that compared with the traditional teaching management method, data mining technology teaching management is closer to the actual requirements. It is better than the traditional teaching management method in terms of the rationality and fluctuation range of the selection of analysis indicators [14]. From the changes in the management data in Fig. 4, it can be seen that the stability of data mining technology is better and the analysis speed is faster. As a result, data mining techniques are more computationally faster, more accurate, and more stable.

**Table 1.** Related parameters

Teaching content	Time period	Manage effects	Digging effect
Course teaching	1–8 weeks	21.05	14.74
	8–12 weeks	7.37	17.89
Specialized teaching	1–8 weeks	8.42	16.84
	8–12 weeks	9.47	9.47
Teacher management	1–8 weeks	16.84	7.37
	8–12 weeks	12.63	11.58

**Fig. 2.** Processing process of education management data

## 4.2 Management Situation

Management data includes unstructured information, semi-structured information, and structural information. After the pre-selection of data mining technology [15], the preliminary teaching management is obtained, and the feasibility of the accounting result management data is analyzed. In order to verify the effect of the analysis more accurately, select education programs with different time periods, as shown in Table 2.

## 4.3 Accuracy and Stability of Teaching Management

In order to verify the accuracy of the data mining technique, the management data is compared with the traditional teaching management method, and the management data is shown in Fig. 3.

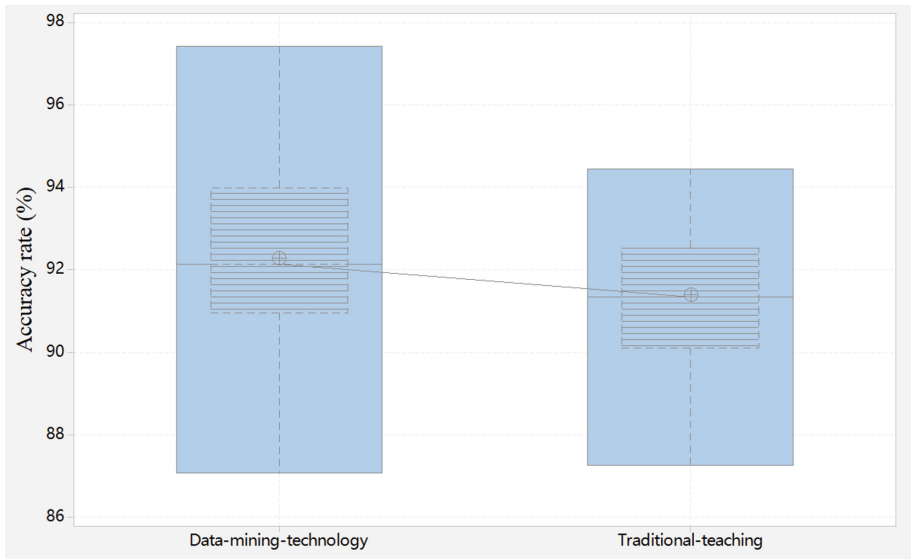
The precise management of college students' education in the era of big data mainly means that in the process of college students' education management, we should fully

**Table 2.** Overall situation of teaching management

Time period	Teaching data	Manage data
1–4 weeks	18.95	16.84
5–8 weeks	21.05	16.84
8–12 weeks	18.95	8.42
Mean	20.00	20.00
$\chi^2$	21.05	14.74
P = 0.031		

integrate the NPC data and related technologies, use its functions to accurately formulate management objectives, accurately select management methods, accurately predict the management process and accurately evaluate the management results, and achieve the set objectives. Therefore, the accuracy of the precise management of college students' education in the era of big data is mainly reflected in four aspects: first, in terms of management objectives, Big data can accurately set ideological and political management objectives [16]. The long-term goal of college students' education and management is to train qualified builders and successors of the socialist future through a series of management activities, but the setting of medium and short-term goals is slightly insufficient. The main reason is that it is difficult to understand the students' interests and ideas, so it is difficult to formulate specific goals. Big data provides a certain method to solve this problem, which can analyze students' thoughts and trends on the basis of collecting a large amount of information, reasonably formulate management goals, and achieve accurate management. Secondly, in the selection of management methods, Be able to use big data to test the use effect of different management methods, and provide reference for the selection of future methods. In terms of management process prediction, big data can obtain reliable process prediction based on information capture [17]. For example, when conducting relevant education management activities, it can predict the problems faced in the process of this management activity, students' acceptance and other aspects based on the content data of similar management activities in the past. Finally, in terms of management effect, big data can achieve accurate evaluation. Human analysis of feedback results has certain subjectivity and may miss important information content [18]. Big data technology can record the information of management process, which is convenient for viewing relevant information on the one hand, and also can visualize the information of education management process on the other hand, providing visual information resources for evaluating the effect of education management, At the same time, it has also accumulated information resources for the future education and management of college students.

It can be seen from Fig. 3 that the accuracy of data mining technology is higher than that of traditional teaching management methods, but the error rate is lower, indicating that the analysis of data mining technology is relatively stable, while the analysis of traditional teaching management methods Uneven. The average management data of the above three algorithms is shown in Table 3.



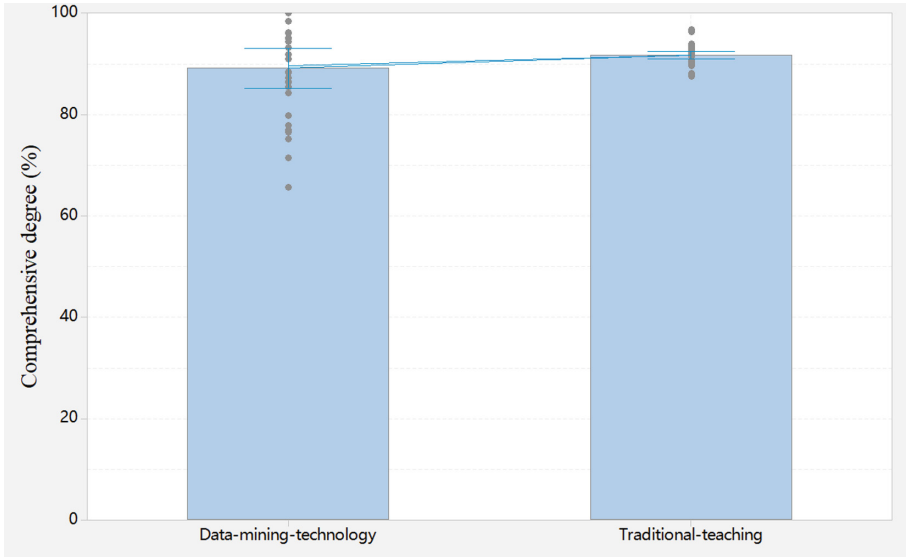
**Fig. 3.** The accuracy of different algorithms

**Table 3.** Comparison of analysis accuracy of different methods

Algorithm	Precision	Magnitude of change	Error
Data mining techniques	96.79	0.36	8.21
Traditional teaching management	85.71	1.07	1.43
P	28.57	50.00	58.93

Table 3 shows that the traditional teaching management method has shortcomings in accuracy and stability in terms of analysis, and the education plan has changed significantly, and the error rate is high [19]. The comprehensive results of data mining technology have high accuracy, which is better than traditional teaching management methods. At the same time, the accuracy of data mining technology is greater than 90%, and the accuracy has not changed significantly [20]. To further verify the superiority of data mining techniques. In order to further verify the effectiveness of the proposed method, different methods are used to analyze the accounting data mining technology comprehensively, and the result 4 is shown.

It can be seen from Fig. 4 that the management data of data mining technology is significantly better than the traditional teaching management method, and the reason is that data mining technology increases the teaching management coefficient and sets the corresponding standard. Eliminate non-compliant management data.



**Fig. 4.** Comprehensive management results of data mining technology

## 5 Conclusion

Under the conditions of civil aviation transportation, in view of the analysis situation, this paper proposes a data mining technology, and combines teaching data to optimize teaching management and manage data Conduct in-depth analysis. Studies show that data mining technology can improve the accuracy and stability of analysis and synthesize teaching content Analysis. However, in the process of data mining technical analysis, too much attention is paid to the analysis of management indicators, resulting in a relative decline in analysis accuracy.

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