



Research on the Application of Data Mining Technology in College Teaching Quality Monitoring and Evaluation System

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Abstract. With the advent of the era of knowledge and information, the web-based management system has been widely used, which not only promotes the innovation of higher education management system, but also improves the management level of teaching management departments. Because there are a lot of data in the university educational administration database, it is very important to find useful information from the database in the evaluation system. This paper makes a quantitative study on the technology in the monitoring and college teaching quality. This research is technology. The first stage of this study aims to determine the main characteristics of teaching quality, which come from different sources, such as students' evaluation, teachers' evaluation and students' views on teachers. The second stage is to use these characteristics.

Keyword: Teaching quality · Data mining · Monitor · Assessment

1 Introduction

The monitoring and in universities is an important link in educational management. With the development of Big data technology, data an indispensable part of the education quality monitoring and evaluation system, providing scientific and digital means for college teaching quality monitoring, improving the efficiency and accuracy of guiding decision-making and improving teaching [1].

Data mining technology can analyze and mine a large amount of educational data (such as students' academic performance, exam time, course selection, course evaluation, etc.) to discover problems or information in quality monitoring [2]. It not only saves manpower, material resources, and time costs, but also greatly improves the monitoring level and evaluation effect, and has great application value.

The monitoring and evaluation system for teaching quality in universities utilizes data mining technology and is generally divided into the following three steps:

(1) Data preprocessing

Collect and organize teaching data related to various disciplines over the years, including student grades, teacher evaluations, inductive question types, teaching progress, etc., to eliminate sampling errors such as abnormal data and missing data, making it more accurate and reliable.

(2) Data mining

Using data mining techniques, perform low dimensional dimensionality reduction, classification/clustering, association/sequence analysis on the preprocessed dataset, and determine quality evaluation indicators through data correlation and various types of analysis modeling, thus obtaining quantitative and scientific results of teaching quality evaluation.

(3) Analyze the results and make decisions

By comparing data mining results with teaching quality objectives, identifying problems and their causes, providing feedback and measures, and making targeted adjustments and improvements to achieve the goal [3].

In summary, the broad application prospects in the monitoring and evaluation system of teaching quality in universities. In practical applications, it is necessary to carefully select data and technologies based on the characteristics and development needs of various disciplines, analyze corresponding data, greatly improve the scientific level of teaching quality monitoring and evaluation, help universities achieve scientific, systematic, and standardized teaching management, and promote innovation [4].

2 Related Work

2.1 Research Status of Teaching Quality Monitoring and Evaluation System in Colleges and Universities

The monitoring and evaluation quality is an important component. Currently, in the digitization and informatization, from the lack of data to the data explosion, there is already enough data in university education scenarios to support a large number of excellent decisions. Researchers advocate the use of data technology for refined evaluation of teaching quality [5]. Driven by the development of digitalization, the current research status and new trends in the monitoring quality in universities are as follows.

(1) Leading Research in Data Technology

In recent years, with the acquisition, processing, analysis, mining and evaluation of teaching quality data has become the core issue of the current construction and evaluation system. Based on relevant technologies such as data mining, machine learning, and

artificial intelligence, the teaching process is analyzed, and quantitative teaching quality indicators are proposed to achieve refined management of education.

(2) Multidimensional teaching quality monitoring

In order to comprehensively monitor teaching quality, the recent research trend is to develop the monitoring and evaluation of teaching quality systems from a single perspective to multiple dimensions [6]. In addition, multidimensional standards help promote better education for students, not only focusing on their academic performance, but also taking into account factors such as teacher effectiveness, satisfaction with the teaching process, and student feedback.

In the process, the teaching quality are developing and dynamic, not constant. Therefore, in the we should use a dynamic perspective to look at this key factor. The evaluation mostly adopts the evaluation by students. Generally, the educational administration department sends the teacher's teaching quality evaluation card to students at the middle or end of the semester. Teachers are scored according to the evaluation items in the evaluation card [7]. After the statistics of the educational administration department, the teacher's evaluation according to the scoring results. However, due to the randomness of students in the process of scoring, different majors have different tendencies towards different courses, and some human factors interfere, students' scoring cannot truly reflect the actual teaching effect [8]. Under this evaluation method, we can only obtain simple and one-sided evaluation results, but can not analyze the evaluation data, so that the teaching evaluation can the guiding role of teaching. How to express, analyze, explain, publish and use the results of teaching evaluation is a new topic worth studying at present [9].

In short, with the continuous strengthening and application of digital technology, the universities is entering a new era of diversification, with accurate and multi-directional coordinates, and will lead the development trend of future changes in research on monitoring quality in universities [10]. Therefore, strengthening the scientific and data-driven management of education, achieving the effectiveness and accuracy of education monitoring and evaluation, is one of the current development directions for universities.

2.2 Data Mining Functions

The while the latter refers to the discovery that patterns. Figure 1 shows the data mining.

The introduction to these two types of functions.

(1) Prediction and verification functions

Prediction refers to the prediction of unknown data from known data. For example, some workers' wages are predicted based on the wages of other workers in the same unit. Trend analysis is to analyze the trend of spatio-temporal data based on past behavior and predict possible future events [11]. Change of things can be obtained through trend analysis. Trend analysis and prediction, named some of them.

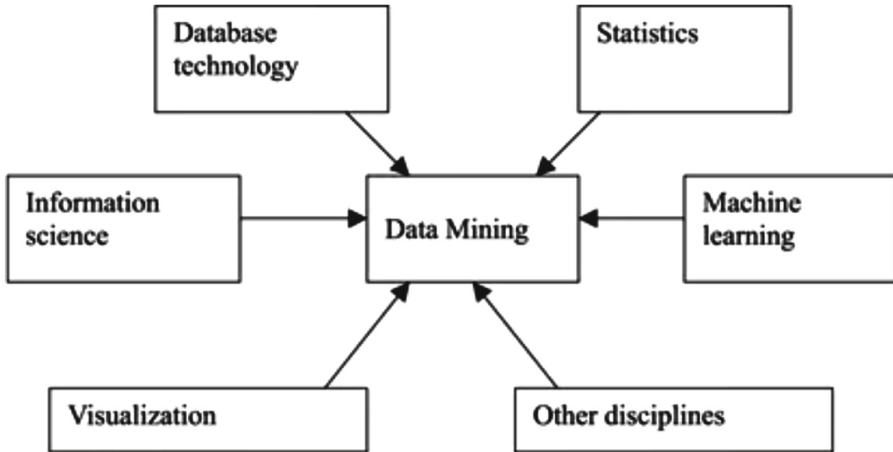


Fig. 1. Several main functions of data mining

- 1) Statistical method: This method can help determine the predicted value of property and estimate the distribution of attribute values based on similar data analysis. Regression analysis is a common prediction method. Regression can not only describe the also predict based on this relationship.
- 2) Association Rule Method: association rules can be used as target attribute values of budgets. This is the property of the target attribute described by the conditional attribute test. The rule can be used to predict the value of the target value.

(2) Describe function

The descriptive function is mainly used to find out the common properties of data, highlight the common characteristics of such data and discover the relationship between data [12].

- 1) Data classification: Data classification is to find a group of objects and create a class group of different things from the same properties and characteristics in the database. Classification is a supervised learning method to establish a classification model. Some sample data will be selected as the sample database of the training set, and some sample data will be used as the test set.
- 2) Data summary and induction: The concept level is a structure that often exists in the database and describes the subordination between data [13]. There are two main. The data cube method, which pre calculates the frequently queried and expensive operations and stores them in the array [14]. The second is the attribute oriented induction method, which expresses that data mining uses a query language similar to SQL to query requests and the use of property, so as to eliminate the functions of concept hierarchy tree, threshold control, communication and a group of data convergence, and finally becomes various rules.

3 The Application of Data Mining in the University Teaching Quality Monitoring

3.1 Establishment of Data Mining Model

Data mining is the from a large amount of data, and its core is to establish a data mining model to achieve the goal of converting data into useful information. The establishment of a data mining model can generally the following steps:

(1) Data collection and preprocessing

First, we need to collect sets according to the needs of mining. In the, we need to consider the integrity and quality of the data. The data may come from different data sources, and we need to Data cleansing the data, remove abnormal data and some useless data.

(2) Feature selection

The features in data play the accuracy and efficiency of data mining models. Choosing appropriate features is crucial. For feature selection, certain statistical testing methods can be used to determine the corresponding weights of each feature and filter out low weight features.

(3) Model selection and establishment

Before selecting a model, it is necessary to first consider the specific situation and characteristics of the target [15]. In different problems and scenarios, different models need to be selected, such as classification, prediction, clustering, association rules, etc. At the same time, different model parameters also need to be adjusted and optimized based on actual situations, in the accuracy and robustness of machine learning.

(4) Model training and testing

The training process of the is to make the model predict or classify the required targets by inputting the original data, so as to obtain the prediction results. In the process of model training, factors such as data set division, batch training, training rounds and Learning rate need to be considered. After the training is completed, independent data needs to be tested to obtain the evaluation results of the model.

(5) Model Application and Update

In the actual application process, the constructed model needs to be applied to the actual data to get the actual results. Meanwhile, due to the dynamic nature of the data, the model also needs to be constantly updated and adjusted.

In summary, the establishment of data mining models is a core part of the entire data mining process. In this process, it comprehensively consider the data, the needs of the problem, and the selection of models, in order to ultimately generate efficient and reliable models, and improve the efficiency and accuracy of data mining.

3.2 Overall Architecture of Application System

The quality in universities is an important component of higher education. Currently, in the context of digitization and informatization, from the lack of data to the data explosion, there is already enough data in university education scenarios to support a large number of excellent decisions. Researchers advocate the use of data technology for refined evaluation of teaching quality.

In general, the teaching will continue to develop iteratively and integrate new Technological convergence such Big data into the system, which will of teaching quality and the popularization of teaching management methods with science and technology as input, so that the teaching and universities will truly move towards refinement, intelligence and visualization. The system in this paper takes the data warehouse as the core, integrates data collection, modeling, management, analysis and presentation, and is designed according to the hierarchical method. The overall framework of the in Fig. 2.

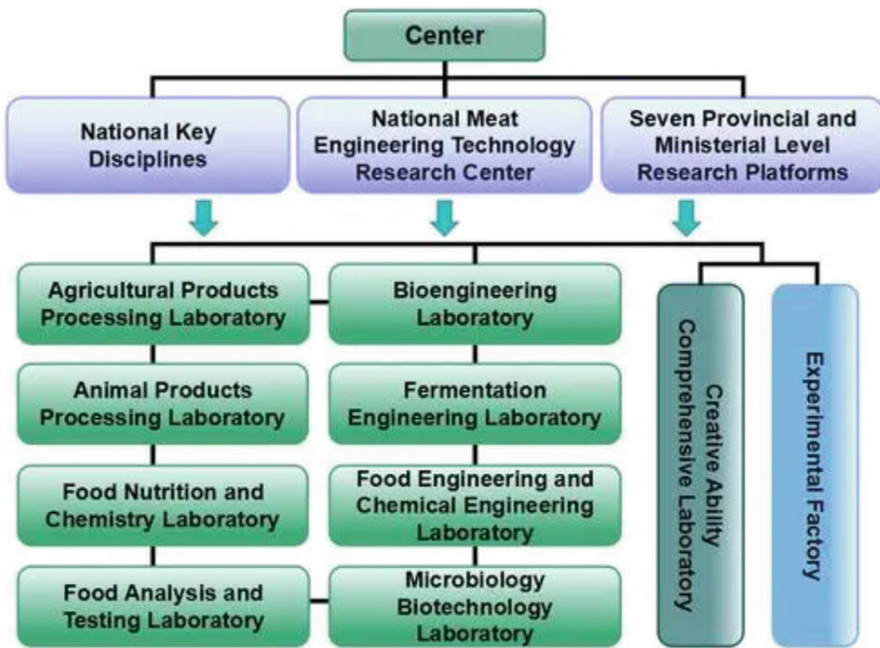


Fig. 2. Structure of teaching quality monitoring system in colleges and universities

The underlying architecture of the system. The data source has the characteristics of distribution, heterogeneity, autonomy, etc. It can the basic situation of the classroom, the situation of teachers' learning and relevant government regulations; The format of these data can be text, database, or report and file. The data related to teaching quality analysis in the data source is copied by the data extraction module and transferred to the data warehouse to provide a consistent data support platform for high-level query and analysis. The data extraction module can set different intermediate processing processes

according to the data differences in different environments. According to the design, it can extract relevant original data from the business, and transfer it to the data integration area, waiting for the next step of data processing and processing. The monitor module is mainly responsible for automatically monitoring the data changes in each data source and notifying the data integration module of the changes. After receiving the change message, the integration module extracts the relevant data into the data integration area.

4 Conclusion

Data mining technology has important application value in the quality in universities. This technology can analyze and mine a large amount of teaching data, thereby helping educational institutions understand information about students' learning situation, teachers' teaching quality, and the utilization, providing scientific basis and decision-making support. At the same time, data mining technology can also help educational institutions establish a teaching quality evaluation index system and prediction model, thereby achieving fast and accurate teaching quality evaluation. In practical applications, data mining technology can also discover and extract knowledge through machine learning algorithms, mining valuable teaching knowledge and teaching quality. The exploration of data mining technology in China is relatively limited, but the selected data sources and volumes, as well as the knowledge obtained through mining, may not meet the needs of university managers. What I did was just a beginning, a wise decision. The size of the data is smaller than, and the complexity of time and space is relatively large. The current can only the next stage. Our goal is to find a fast and effective algorithm. In summary, the application in the monitoring and teaching quality in universities has high practical value and application.

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