Application of Data Mining in the Teaching Management of Colleges and Universities

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Abstract: This paper discusses how to combine data mining with educational administration to excavate useful information hidden in mass data from the data warehouse of educational administration management. It provides the information of decision-making support for the teaching department, promotes better teaching work, improves the quality of teaching, and provides help for the evaluation of teaching quality.

Keywords: Data mining; association rules; educational administration management

INTRODUCTION
With the rapid development of information technology, computer technology and database technology and the popularization of higher education, lots of data have been generated and accumulated in teaching and management work in many colleges and universities. But because of the lack of awareness of information and technology for data processing is just a simple backup, query and statistics, and have in-depth analysis for a large number of data to be captured is conducive to the teaching work of the information, which leads to the information hidden in these data can not be used effectively. Therefore, how to extract information quickly and accurately from vast data warehouse requires a new data analysis technology to deal with, and data mining technology is a feasible and effective way to solve this problem. Using data mining technology for effective knowledge discovery of existing massive educational administration information is an effective way to improve school competitiveness and help managers to make decisions.

1. An overview of data mining technology
1.1 The concept of data mining
Data mining (Data Mining, referred to as DM) is from the large, incomplete, noisy, fuzzy and random data, in which the extraction of implicit, unknown, and potentially useful information and knowledge process, knowledge discovery in database (Knowledge Discovery in the core of Databases, referred to as KDD). Data mining is a cross disciplinary research area based on multi disciplines. It integrates the latest research achievements of database technology, AI, machine learning, statistics, knowledge engineering and object oriented methods. Through this technology, the function of the information system has been maximally utilized.

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1.2 Objects of data mining
According to the information storage format, data mining objects include relational
database, object oriented database, data warehouse, text data source, multimedia database,
spatial database, temporal database, heterogeneous database and Internet.

1.3 Common methods for data mining
The common methods of data mining mainly include association analysis, classification,
prediction, time series pattern and deviation analysis, etc.
1.3.1 Association analysis: association rule mining is first proposed by Rakesh Apwal et al.
There is a certain regularity between the values of two or more variables and more than two
variables, which is called Association. Data association is an important class of knowledge
that can be found in the database. The correlation can be divided into simple correlation, time
series Association and causal association.
1.3.2 Clustering analysis: clustering is to classify data into several categories according to the
similarity, and the data in the same class are similar to each other, and the data in the different
classes are different.
1.3.3 Classification: classification is to find a concept description of a category. It represents
the overall information of such data, that is, the connotation description of the class, and uses
this description to construct the model, which is usually expressed by rule or decision tree
mode.
1.3.4 Prediction: the prediction is to use historical data to find the law of change, to establish
a model, and to predict the types and characteristics of the future data.
1.3.5 Sequential pattern: time series mode refers to a pattern that searches for higher
probability of repeated occurrence through time series. It uses known data to predict future
values, but the difference between these data is the difference in the time of the variable.
1.3.6 Deviation analysis: a lot of useful knowledge is included in the deviation. The basic
way of deviation analysis is to find the difference between the observation result and the
reference, so as to get the abnormal data existing in the database.

2. Process of data mining
1) Determine the object of Mining: define the problem and determine the purpose of
data mining. 2) Data preparation: select the target data extraction data: Data Mining in large
databases and data warehouse; data preprocessing: data processing, including data
consistency, integrity check and data noise, fill in the missing domain, remove invalid data,
etc. 3) Data mining: according to the type of data function and the characteristics of data, the
corresponding algorithm is selected and data mining is carried out on the preprocessed data
set. 4) Result analysis: the results of data mining are interpreted and evaluated, and the
transformation becomes the knowledge that can eventually be understood by the user. 5) The
application of knowledge: apply the knowledge obtained from the analysis to the
organizational structure of the business information system.

3. Application of data mining in educational administration of colleges and universities
3.1 Classroom teaching evaluation
The evaluation of teachers' teaching quality usually involves many factors. The most
important thing is to evaluate teachers' classroom teaching quality from the perspective of
students. Classroom teaching evaluation is an important part of the school teaching
management, and it is the main means to evaluate the achievements of the teaching work. It
plays a role of encouragement, improvement, identification and research on teaching. The
main elements of classroom teaching are teachers, students and teaching information, and
teachers and students interact through teaching information. At present, most schools have to
do classroom teaching evaluation and survey every semester, and have accumulated a lot of teaching information data. At present, the evaluation of teaching is mainly based on numerical calculation. After simply summarizing and summarizing the students' evaluations, the results are notified to the teachers who do not think deeply. The use of data mining technology, data mining in teaching appraisal data, applying association rules and classroom teaching evaluation system, and teachers' teaching quality between the age, title, education, teaching object, the overall quality of teachers and teaching methods of contact. We should equip each class teacher reasonably, so that students can maintain a good learning attitude, so as to provide decision support information for the teaching department, and promote better teaching and teaching quality.

3.2 Reasonable course selection
In order to adapt to the social development of China's higher education system has carried on the reform, the reform of the educational system of the credit system have appeared in various universities, students under the credit system, not only can develop their own learning plan, we can also adjust the learning plan at any time according to their actual situation, but also through the course to improve yourself knowledge. Therefore, the selection of courses has become one of the core of the operation system of colleges and universities. Selection for high grade students may have some relevance, but for the low grade students who have just entered the university gate, for some professional is not very understanding, if in the beginning they formulate their own learning plan, and to choose their own courses, is bound to cause some blindness. Therefore, educational departments should formulate effective prior to Elective Course to guide students, the blind students to a minimum, and the association rules in data mining is to find effective methods for guidelines. By using data mining technology, we can discover potential knowledge and rules from a lot of data accumulated in the school year teaching system, which can effectively guide students to choose classes and reduce the blindness of students in selecting courses.

3.3 Curriculum setting
Curriculum setting usually refers to the plan of curriculum arrangement for various schools or other institutions in all grades, including those courses to be set up, and which courses can be set up in the next semester. Students in the school curriculum is gradual, and the relationship between relevance and sequence of certain course, before learning a course must take some courses as its basis, if the first courses did not learn, is bound to affect the subsequent course of study. With the continuous expansion of teaching scale, educational administration personnel and teachers are hard to find out the relationship between pre curriculum and subsequent courses directly according to the student's score data distribution, and make decisions on teaching process accordingly. In this case, we use data mining technology, mining useful information accumulated in the educational administration system, the relevant departments can make the school regulation related courses, adjusted the number of popular courses and popular courses, through the selection rate and related information to encourage and guide the students to choose complementary courses, so as to improve the overall quality of students also, there is conducive to the rational allocation of teaching resources, provide necessary and accurate theoretical support for decision making.

3.4 Evaluation of teachers' teaching methods
In the process of teaching, teachers can use various methods to complete their teaching tasks, such as teaching method, discussion method, computer-aided teaching method, visiting method, investigation method, practice method and so on. In general, one or several methods can generally be used. Therefore, data mining can be used to mine data in the database, and
decide what teaching methods should be adopted to meet the needs of teaching and help students absorb knowledge. Drawn from the evaluation on teaching method of every student and teaching methods of different teaching results were analyzed, using the method of linear regression analysis, association rules to determine what kind of teaching methods for the students or even several courses, the score level teaching can be further implemented.

3.5 Examination paper analysis and evaluation
Examination is a way to test the effect of teaching and learning, and student achievement is related to many factors. The quality of examination paper is closely related to student achievement. For example, the difficulty of test paper, test coverage of knowledge, form a reasonable distribution. Applying association rules to analysis of test paper database, according to the scores of each question difficulty, degree of distinction, the relevant index, according to the index of several teachers can make accurate assessment of the quality of the papers, which can be used to provide guidance to grasp the situation of teaching and examination for the students themselves the future teaching.

4. Concluding remarks
Data mining is the deep analysis of data information, which can help the decision-makers find the rules, find out the neglected elements, predict the trend, and make decisions. Data mining technology is widely used in marketing, medicine, telecommunications, finance, Internet and so on. The introduction of data mining technology to the field of education, digging out potential information in mass data of university educational administration system, can improve the scientificity of educational management, and at the same time, enhance the effectiveness of educational digitalization.

References