

Research on the Application of Data Mining Technology in Teaching Effect Analysis

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Abstract—The application of data mining technology in teaching effect analysis is discussed. Firstly, the necessity of teaching effect analysis is introduced. Next, the data mining and multidimensional data analysis technology are expounded, and solutions of teaching effect analysis are proposed. Last but not least, the application cases of data mining technology in teaching effect analysis are listed.

Keywords-data mining; multidimensional data analysis; teaching effect analysis

I. INTRODUCTION

“Foundation of Database System” which is the core course of the school of information management major has achieved a great progress by many years of construction and reform. Based on those achievements, the database course group is thinking now how to effectively carry out the next course construction and reform. Teaching effect analysis is an important part of teaching, and the protection of effective teaching and improving the quality of education. Therefore, it is necessary not only to use the scientific method to analyze the effect of course teaching and practice teaching, but also to find some new problems and put forward the corresponding solution.

Today, data mining is one of the research hotspots in the database field which has been widely applied to the economy and business which can produce enormous financial benefits. Currently, in teaching effect analysis, the following analytical methods are often used: standard deviation, validity calculation, and so on. If data mining is applied to the teaching effect analysis, some new problems will be found from the mass data of teaching evaluation and test scores. Therefore, it undoubtedly brings a good method for teaching reform, and improves the teaching quality.

II. DATA MINING AND MULTIDIMENSIONAL DATA ANALYSIS

Generally, data mining (sometimes called data or knowledge discovery) is the process of analyzing data from different perspectives and summarizing it into useful information - information that can be used to increase revenue, cut costs, or both. [1] Data mining software is one of a number of analytical tools for analyzing data. It allows users to analyze data from many different dimensions or angles, categorize it, and summarize the relationships. [2] Technically, data mining is the process of finding correlations or patterns among dozens

of fields in large relational databases. Data Mining has the following characteristics: ①The mining objects are massive, complex, and various types of data. These data may be incomplete or dirty data with the noise; ②The mining results are potential, unknown and diversity; ③The mining method is uncertain; ④ Online data access is supported; ⑤ Many technologies are integrated in data mining. The following are the data mining functions and the model types found from data mining: ① Summarization rule; ② Association rule; ③ Classification rule; ④Clustering rule; ⑤Prediction analysis; ⑥ Trend analysis; ⑦Deviation analysis.

On-Line Analytical Processing (OLAP) is a category of software technology that enables analysts, managers and executives to gain insight into data through fast, consistent, interactive access to a wide variety of possible views of information that has been transformed from raw data to reflect the real dimensionality of the enterprise as understood by the user. Multidimensional analysis technology is the core of OLAP. [3] Dimension is a structural attribute of a cube that is a list of members, all of which are of a similar type in the user's perception of the data. The measurement is the target or object to be analyzed. Basic concepts of multidimensional support multidimensional slice, dice, rotation and other analysis, which can enable users to observe the data in the data warehouse from multi angle.

This study will select some data mining methods to analyze the teaching effect of “Foundation of Database System” and its practice teaching, and put forward the corresponding countermeasures, in order to do better in teaching work and provide a certain reference for improving of students' study quality.

III. TEACHING EFFECT ANALYSIS SOLUTIONS

Teaching effect analysis is carried out mainly from the following factors.

A. Analysis of Course Teaching Effect of “Foundation of Database System”

Firstly, analysis was carried out sequentially based on the students' evaluation of teaching for teachers, students' test scores, students' comprehensive performance analysis, process assessment of students, course knowledge, student characteristics, teacher characteristics, etc. Then, the

correlation and principal component factors were mined by using the above analysis factors.

B. Analysis of Practice Teaching Effect of "Foundation of Database System"

Firstly, analysis was carried out sequentially based on the students' evaluation of teaching for teachers, students' test scores, students' comprehensive performance analysis, process assessment of students, course knowledge, student characteristics, teacher characteristics, etc. Then, the correlation and principal component factors were mined by using the above analysis factors.

C. The Main Influence Factors of Relative Courses Teaching Caused by "Foundation of Database System"

The related courses of "Foundation of Database system" mainly include "Course Design of Database", "Oracle Database Management System", "Database and Application Fundamentals", "DB2 Family Fundamentals", "DBA for Linux UNIX and Windows" and so on, as shown in Figure I. These courses are complementary to each other, so it will play a great guiding role for the further coordination between courses to mine the main influence factors of relative courses teaching caused by "Foundation of Database system".

D. Countermeasures

According to the analysis conclusion of (1) - (3), teaching reform countermeasures were put forward to guide the next step of course construction and course reform.

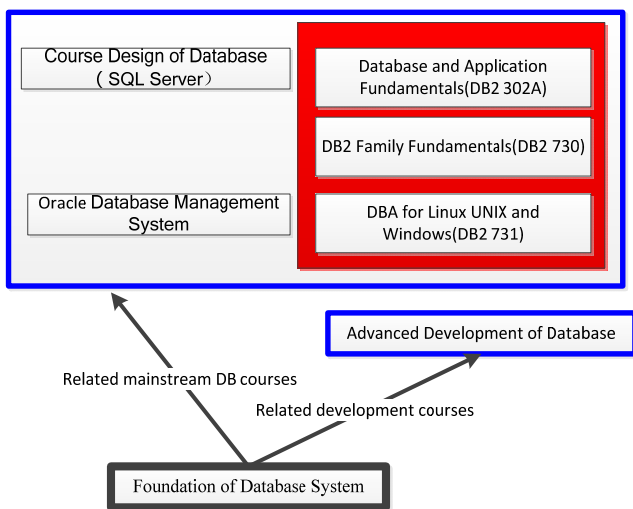


FIGURE I. RELATED COURSES OF "FOUNDATION OF DATABASE SYSTEM"

IV. APPLICATION CASES

A. Basic Data Analysis

The basic T-SQL can be carried out on the comparative analysis of the same course scores in different grades and the different courses scores of in the same grade, as shown in Figure II and Figure III.

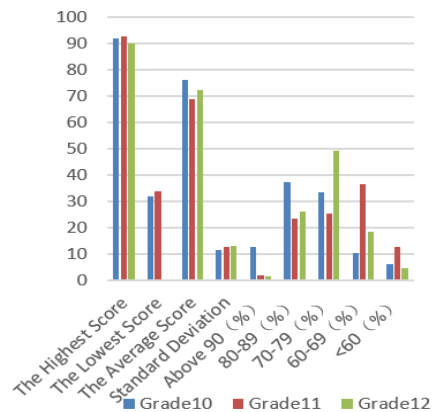


FIGURE II. SCORE COMPARISON OF "FOUNDATION OF DATABASE SYSTEM" IN DIFFERENT GRADES

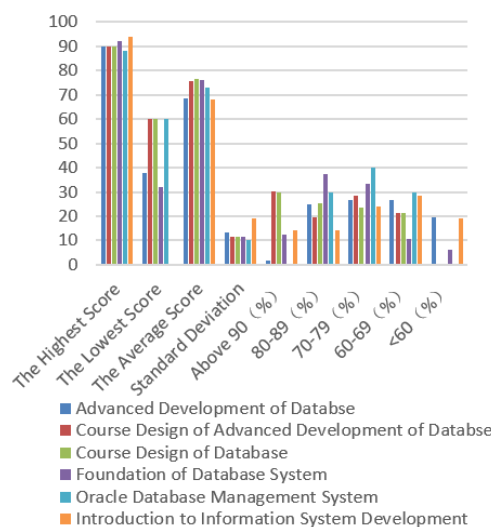


FIGURE III. SCORE COMPARISON OF DIFFERENT COURSE IN GRADE 10

B. Multidimensional Data Analysis

Figure IV shows the multidimensional analysis of the students' scores of different courses of different classes in different grades.

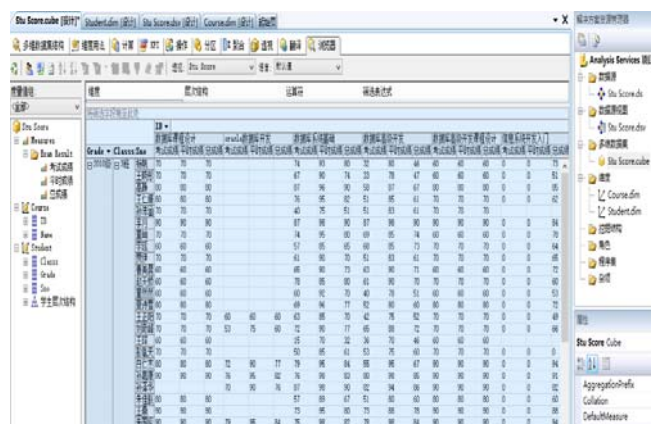


FIGURE IV. MULTIDIMENSIONAL DATA ANALYSIS

C. Data Mining

Cluster analysis is the process of dividing a given data set into a number of categories or clusters (Cluster). [4] After being clustered, data samples of the same types have higher similarity, and data samples of the different types have lower similarity. The similarity can be calculated according to the specific value of the description attribute of data samples, which is usually expressed by the distance between data samples. K-Means algorithm is used here. The basic steps of the K-Means algorithm are shown in Figure V.

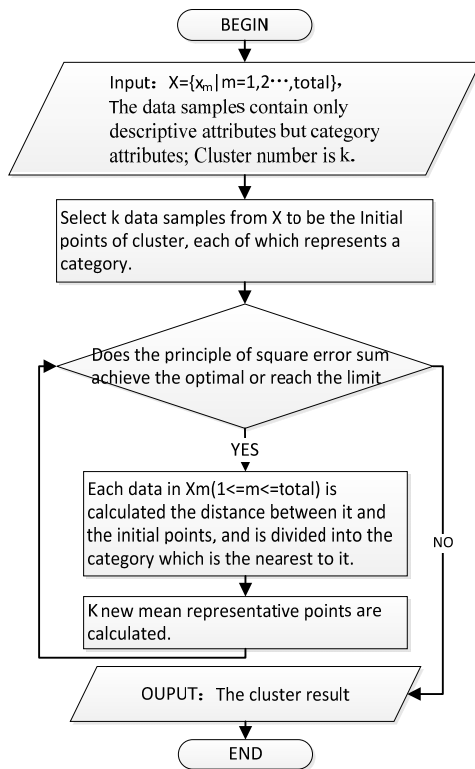


FIGURE V. BASIC STEPS OF K-MEANS ALGORITHM

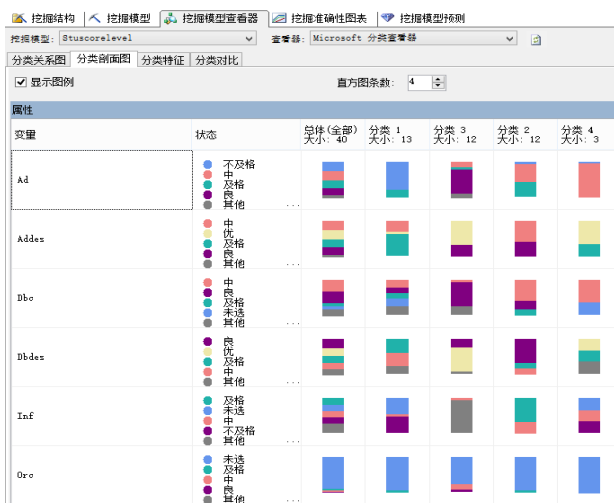


FIGURE VI. CLUSTER RESULTS

Figure VI shows the cluster results of students by clustering algorithm based on the examination of students in different courses. According to the cluster results, teachers can teach and give the course guidance to students.

V. CONCLUSION

The research of this subject has changed the traditional teaching methods. The research method of data mining is applied to the research of teaching reform, which has certain scientific and advanced nature. Using the method of data mining to analyze, it's good to balance the difference in teaching effect caused by different teachers, different students, different teaching methods and other factors, so as to achieve a diversified analysis.

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