

The Application of Data Mining Technology in the Evaluation of Teaching Quality in Universities

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Abstract: Data mining technology is a product of the development of the new era. Unlike other similar technologies, data mining technology is mainly committed to solving various application problems, and the main means of solving problems are to use big data technology and machine learning algorithms. Simply put, data mining technology is like panning for gold in the sand, searching for useful information among massive amounts of information. Data mining technology is widely applied in various fields, such as scientific research and business, and also has its shadow in the education industry. Currently, major universities are applying data mining technology to teaching quality evaluation. This article first explains the impact of data mining technology on the education industry, and then specifically discusses the application of data mining technology in the evaluation of teaching quality in universities.

Keywords: Data Mining Technology; Universities; Teaching Quality Evaluation

1. Introduction

Education is the foundation of a country and an important industry that cultivates talents for the country and transports core talents for various industries. In order to improve the quality of education, educational researchers continuously update the education and teaching evaluation system through continuous research and discussion. Data mining technology provides a reliable method for teaching evaluation systems, help educators more easily identify shortcomings in teaching, and continuously update and improving educational methods. Data mining technology is supported by computer science and technology disciplines, involving multiple fields such as big data and artificial intelligence. It is interconnected with the information age and applies cutting-edge technology in social education, greatly promoting the transformation of the education industry towards a new era of education.

2. The current status of teaching quality evaluation in universities

The current evaluation of teaching quality in universities mainly comes from two aspects: the first is student evaluation. Student evaluation, as the name suggests, refers to how students rate the work attitude of teachers, such as whether homework is carefully graded, whether lectures are detailed and comprehensive, and whether their attitude towards students is friendly. Due to the fact that teaching mainly targets students, their learning experience is very important; The second is teacher evaluation. Teacher evaluation is mainly conducted through leadership supervision and other teacher scoring methods. Teacher mutual evaluation is also important, helping teachers supervise each other, learn from each other, and make progress together. At the same time, it can help teachers communicate and learn from each other in teaching the same subject.

3. The benefits of data mining technology for teaching quality evaluation

Firstly, introducing data mining technology into the evaluation of teaching quality in universities is conducive to helping various universities establish a reasonable teaching quality evaluation system. By using scientific and feasible technologies to evaluate teaching quality, schools can have an accurate value judgment of teaching quality. This can change the blind evaluation of teaching quality in the past and maximize the role of teaching quality evaluation, and better serve students' learning.

Secondly, data mining technology can also guide schools in teaching management. Through reasonable and scientific methods for

data collection, data mining technology can search for factors that are conducive to improving teaching quality in a large amount of data. Schools can use this method to gather teachers with this characteristic together for teaching research. Similarly, it can also help teachers with low teaching quality to identify their own shortcomings and facilitate the correction of their own mistakes. School leaders can use this feature to invite experts and educational researchers to provide purposeful training to teachers in order to improve teaching quality.

Finally, data mining technology is also conducive to promoting reforms in the education industry. Education is in the process of transitioning from traditional teaching models to new teaching models. Similarly, educational management models should also keep up with the times. By utilizing the characteristics of the information age, data mining technology can utilize a large amount of data to determine the key and difficult points in teaching, clarify students' mastery of knowledge, and enable teachers to continuously transform teaching methods and change educational models to truly achieve individualized teaching.

4.The application of data mining technology in teaching quality evaluation

4.1 Design ideas

When applying data mining technology to the evaluation of teaching quality, it should first be clear that using data mining technology is to evaluate teachers' teaching. Students' final grades for the entire semester can be used as data, and teachers' work can also be evaluated in the form of questionnaires. Then formulate specific operational steps, that is, search for unfavorable factors in the teacher's teaching work through a large amount of data, which is beneficial for the teacher to find their own shortcomings. Therefore, using data mining technology can assist teachers in their own teaching work and improve teaching quality. Finally, a systematic summary of the rules derived from the FP growth algorithm in the decision tree is conducted to identify the general laws that affect the quality of teaching.

4.2 Building models and data processing

4.2.1 Building a teaching quality evaluation module based on student grades

Constructing a mining model based on student grades can utilize student grade data in the academic administration system, consisting of attributes such as teacher ID, teacher title, teacher gender, teacher education, student average score, and student class. After a series of data transformations, a decision tree algorithm is used to find the root node that can serve as a decision, such as the attribute that is most relevant to performance analysis. Finally, using the method of continuous recursion, all attributes except those as root nodes are classified and classified to form a decision tree.

Divide the grades of all students in the class into four levels: 90 to 100 as excellent, 80 to 90 as good, 60 to 80 as average, and below 60 as failed. We use four levels as the four basic intervals and the proportion of students in each interval to the total number of students in the entire class as an important indicator for evaluating the quality of teacher teaching, and establish a classification model for evaluating the teaching quality of teachers, based on exam scores as the fundamental basis, which can form a basic evaluation result based on the level of student grades, and then use the classification model formed by decision trees to form rules.

4.2.2 Building a module for students to evaluate teaching quality

We can construct a module for students to evaluate teaching quality, using students' evaluations as the basic data for evaluating teaching quality. Therefore, the evaluation content should be established as follows: do not be late for class or leave early, timely interaction and communication with students, sufficient lesson preparation, and careful grading of student assignments, appropriate classroom usage methods, attempting to adopt innovative teaching methods, the classroom atmosphere is witty and humorous, which can easily stimulate students' enthusiasm, standardized and accurate teaching language; Teaching attitude is serious and meticulous, respect and love students; Teachers have a serious and rigorous attitude towards teaching work, and assist students in reviewing after class, in order to interact and communicate with students outside of class to understand their learning experiences and timely lead students to review knowledge.

The specific evaluation content mentioned above can be in the form of a survey questionnaire for students to evaluate the work of teachers, using single choice, multiple choice, or scoring methods. If all students in a certain major participate in the survey questionnaire, the number of people who have not participated in the survey questionnaire should be identified, and the number of

people who have participated in the survey questionnaire should be determined. The results of the survey questionnaire should be divided into four levels: A level, B level, C level, and D level, form a teaching evaluation information table.

4.2.3 Using data mining techniques to identify rules and draw conclusions

Through a series of algorithms based on the decision tree FP growth and continuous filtering, it is easy to obtain some data items that are related to the quality of teaching. For example, teachers with higher "teacher titles" have higher excellent rates of students in their classes; Teachers with a gender of "male" are evaluated by students as having a "humorous classroom atmosphere, which can easily stimulate students' enthusiasm"; Teachers with a gender of "female" are evaluated by most students as "timely interaction and communication with students, sufficient lesson preparation, and conscientious grading of student assignments"; Teachers under the age of 40 are mostly evaluated by students as having appropriate classroom usage and attempting to adopt innovative teaching methods.

The rules that can be obtained through data mining are: teacher titles are associated with student grades, teacher gender is associated with evaluation scores, and teacher age is associated with evaluation scores. Therefore, it can be concluded that teachers with higher professional titles have higher teaching efficiency and quality. The reason is that teachers with higher professional titles have more experience and are more likely to detect students' mastery of knowledge points, and better understand how to stimulate students' interest in learning; Compared to female teachers, male teachers tend to give witty and humorous lectures, while female teachers approach teaching work more meticulously and pay more attention to students' learning experiences. Teachers of different genders also provide students with different learning experiences; Compared to older teachers, younger teachers are more likely to try new teaching methods and excel at continuous innovation. Older teachers have rich teaching experience, but long-term use of one or more teaching methods can easily lead to students forming fixed thinking. For young teachers who have just entered the education industry, it is easier to combine the characteristics of the times and constantly update and explore educational methods.

6. Conclusion

Teaching quality evaluation is an important aspect of school education, with the main purpose of improving the teaching quality of teachers and cultivating more outstanding talents. The times are constantly changing, and the education industry should also adapt to the development of the times, making full use of the product of the new era - data mining technology. This not only helps school managers discover the problems and existing drawbacks that teachers encounter in education work, but also enables them to grasp the teaching advantages of each teacher, making it easier to train and manage teachers. At the same time, data mining technology can also intuitively present students' evaluations of teachers, thereby continuously screening and summarizing general rules to help teachers improve teaching quality.

References

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