The Application of Data Mining Technology in the Evaluation of English Teaching

Huiyin Chen[1,a*], Sicheng Wang[1,b]

[1]*Nanchang Vocational University, Jiangxi, Nanchang,330500, China*
[a]Corresponding author's e-mail: gyx84562@163.com
[b]Corresponding author's e-mail: gyx010306@163.com

Abstract

The evaluation of teachers' teaching quality in colleges and universities can effectively improve the quality of teaching and regulate teaching behavior. This article has conducted an in-depth study of the current data mining technology, and analyzed the advantages and disadvantages of each data mining technology. This article constructs a scientific English teaching evaluation system, through this system, students can evaluate teachers' teaching behavior from multiple dimensions. This paper establishes a data mining system that can find valuable information that can improve teaching quality from a large amount of teaching-related data and a large number of students' evaluations of teachers, and pass this information to teachers. This system mainly regards teaching attitude, teaching content, and teaching methods as the main aspects of teaching evaluation, which reduces the attributes of mining libraries and improves the efficiency of mining. This system mainly uses decision tree algorithm to mine teaching information. First, the teaching evaluation decision tree is constructed, and then the decision tree is pruned, the corresponding rules are extracted, and the knowledge base is created.

Keywords-*Data mining technology; English; teaching evaluation; big data*

1. INTRODUCTION

In recent years, with the expansion of college enrollment, the quality of students in colleges and universities has gradually declined. In order to be able to cultivate high-quality talents, colleges and universities have put forward higher requirements on the teaching quality of teachers. In order to improve the quality of teachers' teaching and make teachers more intuitively aware of the problems that arise in their teaching, teaching evaluation has become an issue that must be paid attention to in the construction of colleges and universities. Nowadays, college English teaching evaluation methods are almost always to let students choose the teacher's teaching quality "good" or "bad". This method is difficult to explain the detailed factors of teaching quality in detail, and it is also difficult to find out from the collected raw data. Laws related to teaching quality. There are also some problems in the teaching evaluation analysis system used in colleges and universities. The teaching evaluation does not hide student information, does not analyze the results of the teaching evaluation, etc. These problems make the teaching evaluation ineffective. The application of this system allows college administrators to perform a good mining and classification operation on a large amount of data through simple operations, and to show teachers intuitive teaching evaluation and analysis results[1].

2. DATA MINING TECHNOLOGY

2.1. The overall steps of data mining

Data mining is the process of extracting potentially useful information and knowledge hidden in it, people do not know in advance, from a large amount of incomplete, noisy, fuzzy, and random data. Data mining is a part of big data technology. Data mining can discover knowledge from a large number of data sources, so it is difficult to guarantee the integrity, consistency and correctness of the data [2]. In data mining technology, the most important thing is the efficiency, effectiveness and scalability of data mining. Compared with traditional database query systems, data mining technology does not have strict requirements on query expressions, and does not generate strict result sets [3]. It can respond quickly to rapid changes in data, and the data processed is very large. The objects faced by data

mining can be structured data, semi-structured data, and unstructured data, such as text data, image data, video data, web data, and so on.

Data mining can analyze large amounts of data to help users make decisions and forecasts. Supporting the methods and processes of big data analysis, choosing or establishing a data environment suitable for data mining applications is an important subject of data mining research. The steps of data mining are shown in Figure 1.
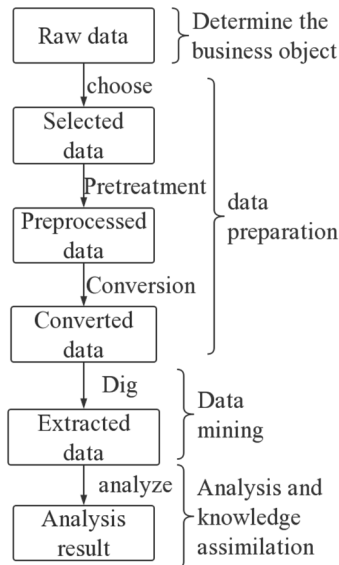

Figure 1. The basic process of data mining

Before starting data mining, it is necessary to have a clear definition of the target and predict the problems to be explored to prevent blindness in data mining. Data mining also needs to prepare a large amount of data, eliminate the data that has nothing to do with the target, and preprocess and transform the data [4].

Data mining can handle a large amount of daily business data, but these data usually have noise and a large number of vacancies. Therefore, preliminary preprocessing of the data can avoid data mining that consumes too much time or the analysis results are interfered by invalid data [5]. Data preprocessing includes several steps: data cleaning, data integration and transformation, and data specification [6].

2.2. Commonly used algorithms for data mining

Algorithms commonly used in data mining include decision tree algorithm, clustering algorithm, and Apriori algorithm [7].

Decision tree is an algorithm commonly used in classification and prediction models. The decision tree algorithm can classify a large amount of data purposefully, and further find valuable current information. The advantage of decision tree algorithm is

simple description, fast classification speed, and the application object is usually large-scale data processing. The decision tree takes the attributes of the samples as nodes, and takes attribute values as the tree structure of branches. The decision tree is produced by analyzing and summarizing a large number of samples of data rows using the principles of information theory. The root node of the decision tree is the most informative attribute among all samples. The middle node of the tree is the attribute with the largest amount of information in the sample subset in the root subtree. The leaf nodes of the decision tree are the category values of the samples. The decision tree can accurately identify the categories of all samples, and can efficiently classify new samples.

The class of the data object processed by the clustering algorithm is unknown. The clustering algorithm is the process of grouping a collection of objects into multiple clusters composed of similar objects. There are three methods of clustering algorithm, partitioning method, hierarchical method and grid-based method. The partitioning method will give a database of N objects or tuples, a partitioning method constructs k partitions of the data, each partition represents 1 cluster, and k<N.

The Apriori algorithm focuses on determining the relationship between different domains in the data, and finding the dependency relationship between multiple domains that meet the given conditions. The Apriori algorithm mines the Apriori property level by level, and all non-empty subsets of frequent itemsets must be frequent. According to frequent k-itemsets, frequent (k+1)=itemset candidates are formed, and the database is scanned once to complete the kth iteration to find the complete frequent (k+1)-itemsets Lk+1. The Apriori algorithm is simple and easy to understand, but it is expensive to scan when faced with a large amount of data [8].

These algorithms have different characteristics. The selection of algorithms in this study should be carefully considered based on the characteristics of the data faced by the system. There are a large number of highly efficient people and a large number of courses. Therefore, this system needs to process a large amount of data and needs a stable, good performance, and low cost algorithm. So the best choice is the decision tree algorithm [9].

3. PRINCIPLES OF COLLEGE ENGLISH TEACHING EVALUATION SYSTEM

The evaluation system of English teaching in colleges and universities should pay attention to the scientific nature, and the cost reflects the guidance of the evaluation. Therefore, in the evaluation system, it is necessary to focus on those evaluation aspects that have an effect on English teaching, and form a complete

evaluation system, so that every aspect can be Take into account, and each aspect is more balanced. At the same time, the evaluation system of college English teaching should also pay attention to operability. The content of the evaluation system should be the phenomena and behaviors that can be observed by students, and it should be more convenient for students to conduct grade evaluation. At the same time, the content of the evaluation should not be too much. More, in case the system is difficult to handle or students have difficulty filling in. Teaching is a complex system composed of multiple elements. It is a dynamic and changeable process of understanding and practice. The evaluation system should focus on reflecting the whole process of teaching, highlighting the key points of evaluation, and reflecting the quality of teaching activities [10].

4. CONSTRUCTION METHODS AND MODELS OF COLLEGE ENGLISH TEACHING EVALUATION SYSTEM

According to the characteristics of college English teaching, the construction method chosen in this paper is the analytic hierarchy process. The analytic hierarchy process can decompose a complex problem and transform it into quantitative analysis. The analytic hierarchy process needs to establish a multi-level ladder structure for each factor of the system attribute, and then compare the factors at each level one by one, and finally obtain the judgment matrix, calculate the eigenvalues and eigenvectors of the judgment matrix, and calculate the factors of each level of the system Comprehensive importance.

The quality of teaching requires students to evaluate from multiple aspects. The teaching evaluation system of this article is mainly evaluated from five aspects, namely, teaching attitude (B1), teaching design (B2), teaching content (B3), teaching methods (B4), and teaching ability (B5). In these aspects, there are many small categories to further refine the evaluation system. Under B1, there is a correct teaching attitude, no late and no absence C1; emphasis on tutoring and correction of homework C2; emphasis on teaching information feedback C3; serious teaching, familiar with the textbook C4; clear teaching objectives C5; teaching strategy design C6; teaching process design C7; The scientificity of knowledge C8 and so on. Under each B, there are three to four small branches for students to evaluate in detail. This ladder structure evaluation model allows the system to construct a judgment matrix to compare the importance of each element at the same level with respect to a criterion in the previous level.
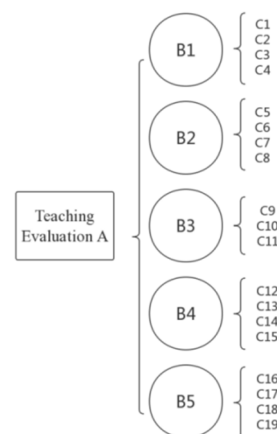

Figure 2. Teaching Evaluation System

5. THE BASIC STRUCTURE OF COLLEGE ENGLISH TEACHING EVALUATION SYSTEM

The basic structure of this teaching evaluation system is shown in the figure below.
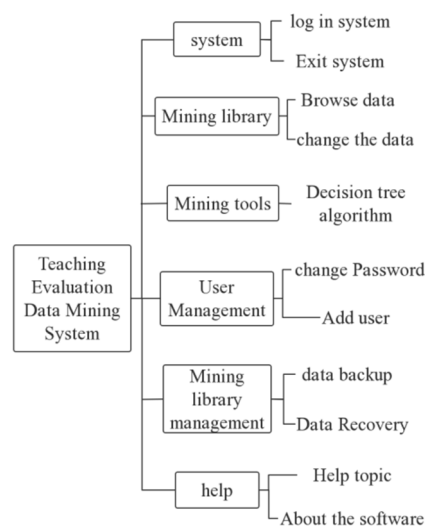

Figure 3. Functional structure diagram of teaching evaluation data mining system

In order to ensure data security, the first thing the system must build is the login module. Personnel who do not have access to the database can modify the database data.

The main function of the data management module is to display data. Display the data stored in the Microsot SQL Server 2000 database in the form. Users can also modify, add, and delete data in the database.

The teaching evaluation mining module has a total of four functions, namely, building decision trees, pruning decision trees, rule extraction, and rule verification. The establishment of a decision tree is mainly to display the results of the user through the classification of a large amount of data in the mining

database. Pruning the decision tree is mainly to prune the decision tree to improve the accuracy of the mining results. Rule extraction is to extract the corresponding rules separately according to the different paths of each leaf node after decision pruning. In the rule verification module, the validity of each rule in the test data set is tested.

The user management module includes the management of user rights, and realizes the modification and protection of passwords. After the user logs in to the system, he can change the password and perform other operations to increase the security of the system and data.

Database management can back up and restore the database to prevent errors during user operations and cause the database to be unusable.

6. CONCLUSION

Teaching evaluation is an important index to measure the quality of teaching in colleges and universities, and it is also an important basis for teaching, which is related to the learning effect of students. The teaching evaluation methods adopted by most colleges and universities today are relatively primitive. In order to allow teachers to have a clearer understanding of the results of teaching evaluation, this article reconstructs the English teaching evaluation system and uses the Analytic Hierarchy Process to allow students to evaluate teaching from all aspects. To score. This article also preliminarily constructed a simple English teaching evaluation system, and then we will continue to improve it so that the system can be presented to users.

REFERENCES

[1] Guoqing Zhou. Data Mining for Co-location Patterns:Principles and Applications[M].CRC Press:2021-08-24.

[2] Bhargava Neeraj,Bhargava Ritu,Rathore Pramod Singh,Agrawal Rashmi. Artificial Intelligence and Data Mining Approaches in Security Frameworks[M].John Wiley & Sons, Inc.:2021-08-10.

[3] Dash Sujata,Pani Subhendu Kumar,Balamurugan S.,Abraham Ajith. Biomedical Data Mining for Information Retrieval:Methodologies, Techniques and Applications[M].John Wiley & Sons, Inc.:2021-08-06.

[4] Kluska Jacek,Madera Michal. Extremely simple classifier based on fuzzy logic and gene expression programming[J]. Information Sciences,2021,571:

[5] Victoria C. P. Chen,Seoung Bum Kim,Asil Oztekin. Preface: Data mining and decision analytics[J]. Annals of Operations Research,2021(prepublish):

[6] Matveev S. A.,Oseledets I. V.,Ponomarev E. S.,Chertkov A. V.. Overview of Visualization Methods for Artificial Neural Networks[J]. Computational Mathematics and Mathematical Physics,2021,61(5):

[7] Nelson Laura K.. Knowledge Discovery in the Social Sciences: A Data Mining Approach[J]. Contemporary Sociology: A Journal of Reviews,2021,50(4):

[8] Furner Michael,Islam Md Zahidul,Li Chang-Tsun. Knowledge discovery and visualisation framework using machine learning for music information retrieval from broadcast radio data[J]. Expert Systems With Applications,2021,182:

[9] Kaushik Minakshi,Sharma Rahul,Peious Sijo Arakkal,Shahin Mahtab,Yahia Sadok Ben,Draheim Dirk. A Systematic Assessment of Numerical Association Rule Mining Methods[J]. SN Computer Science,2021,2(5):

[10] Sáiz Manzanares María Consuelo,Payo Hernanz René Jesús,Zaparaín Yáñez María José,Andrés López Gonzalo,Marticorena Sánchez Raúl,Calvo Rodríguez Alberto,Martín Caroline,Rodríguez Arribas Sandra. Eye-tracking Technology and Data-mining Techniques used for a Behavioral Analysis of Adults engaged in Learning Processes.[J]. Journal of visualized experiments: JoVE,2021(172):