Evaluation System of College English Teaching Based on Big Data

Qingyan Tan\textsuperscript{1,*}

\textsuperscript{1}College of Foreign Language, Hubei Polytechnic University, Huangshi, 435003, Hubei, China

*Corresponding author E-mail: danqyan312@hpou.edu.cn

Abstract. Teaching quality is the fundamental guarantee for colleges and universities (CAU) to achieve their educational goals, and is the basis for training talents. In recent years, an important research field of big data is the research of Data mining (DM). The use of DM algorithms can find out the key factors affecting teaching quality, provide a strong basis for teaching arrangements and teaching management in universities, and then improve the teaching level of universities. The purpose of this article is to study the evaluation system of college English teaching (ET) based on big data. Based on the idea of DM, this paper designs and implements a college ET quality evaluation system (ETQES), and applies the system to the college ET quality monitoring system, and obtains a large amount of evaluation data. This paper extracts relevant data from the school’s ETQES, teacher management system, comprehensive educational administration and other system databases, and builds a data warehouse through data preprocessing. This paper implements the DM module of the ETQES to mine the data in the data warehouse. Through the analysis of these rules, the factors affecting the evaluation results of ET quality are obtained. This paper establishes a database suitable for mining association rules. Through the analysis of association rules, find out which key factors can affect the quality of ET, so as to provide a strong basis for ET decision-making and management. According to the experimental results, it can be concluded that the 4555-year-old teacher gets a higher student evaluation score, indicating that teachers of this age group are more popular with students.

Key words: Big Data, Data Mining, Association Selection, English Teaching Evaluation

1. Introduction

DM technology based on big data can discover useful knowledge from large amounts of data [1-2]. Through fair and objective statistical analysis, it discovers potential laws from a large amount of data and finds hidden patterns, and can accurately grasp the future dynamics [3-4]. The DM technology is combined with the college ET evaluation system, and the useful information hidden in the data is
extracted from the massive data [5-6], and the functions of the existing management information system are used to the greatest extent to make it more Meet the needs of college ET evaluation [7-8].

In the research on the evaluation system of college ET based on big data, many scholars have studied it and achieved good results. For example, Peng N proposed the concept of mining association rules between item sets in the customer transaction database. Therefore, many data researchers Do a lot of analysis and research on data association technology. These data researchers mainly made in-depth analysis on the optimization of big data algorithms [9]. Zhao X uses the partition-based Apriori improved algorithm to mine some of the data, generates strong association rules, finds out the relationship between various attributes of teachers and the results of teacher evaluation, provides theoretical basis for school decision-makers, and finally realizes the theory and the combination of practice can effectively improve the school's running level [10].

Based on the idea of DM, this paper designs and implements an online evaluation system for classroom ET quality through the analysis of the structure and function of the classroom ETQES in CAU, and applies it to practice to obtain ET quality evaluation data. This article introduces the specific mining process of DM in the evaluation of college ET, and conducts in-depth analysis of the mining results to derive valuable strong association rules, find out the relationship between each attribute and the evaluation results, and realize DM in the specific application of CAU achieves the purpose of combining theory and practice.

2. College ET Evaluation System Based on Big Data

2.1 Construction of ET Evaluation System Model

(1) Establish the hierarchical structure of the evaluation system
The Analytic Hierarchy Process requires a systematic analysis of the scope of the system, the factors it contains, and the relationship between the factors, establish the goals, evaluation criteria and index system to be achieved by the system, and create a corresponding hierarchical structure.

The application of analytic hierarchy process has different purposes, and the hierarchy can be selected and adjusted accordingly. For example, when selecting the evaluation index system to determine the index weight ranking, the first 2 or the first 3 hierarchical structures can be used. When choosing a decision-making plan an alternative layer should also be added.

(2) Calculate the weight vector
The corresponding formula is:

\[ W_i = \frac{\sum_{j=1}^{n} a_{ij}}{\sum_{k=1}^{n} a_{ik}} \]  

(1)

In some special situations, the judgment matrix can have consistency and transitivity. Normally, this property does not require the judgment matrix to be strictly satisfied. However, a correct ranking of the importance of the judgment matrix requires certain logical laws from the perspective of human understanding.

(4) Check consistency
First, calculate the C.I. (consistency index) according to the one-time index

\[ C.I. = \frac{\lambda_{\text{max}} - n}{n-1} \]  

(2)

Again, calculate and determine the consistency ratio C.R. (consistency ratio)

\[ C.R. = \frac{C.I.}{R.T.} \]  

(3)

When C.R.<0.1, it is considered that the consistency of the judgment matrix meets the requirements; when C.R.>0.1, the judgment matrix cannot be accepted and does not meet the consistency requirements, and the judgment matrix must be revised.

2.2 Application of DM in the Evaluation System of College ET Quality
(1) Determination of DM goals
Determining the goal of DM is an important step in DM. Through the practical application of the college classroom ETQES in the college undergraduate ET quality monitoring system, a large amount of evaluation data has been accumulated in the system database, and these evaluation data continue to increase. In the face of these complex data, how to analyze these data analyze the problems that teachers have in classroom ET, and how to improve the quality of classroom ET, and effectively manage ET is a common concern for teachers and managers.

Based on the above requirements, the goal of DM in this project is to find factors that affect the results of teachers’ ET quality evaluation through DM on ET quality evaluation data and related data, so as to analyze these influencing factors and propose improvements Methods of ET quality.

(2) Establishment of DM model
Based on the goal of DM in this topic, after analyzing the data structure in the classroom ETQES, the teacher management information system and the comprehensive educational administration system database, mining can be built around two aspects of the teacher’s personal factors and the attributes of the teacher’s class model.

1) Teacher personal factor mining model
There may be a certain relationship between teachers' gender, age, professional title, academic degree and other personal factors and teachers' ET quality. Therefore, this paper establishes a teacher's personal factor mining model, analyzes the relationship between these factors and the evaluation results of ET quality, in order to find relevant factors that affect the quality of ET.

2) Attribute mining model of teacher's class
In the actual operation of ET, in addition to the influence of teachers’ personal factors on the evaluation results of ET quality, factors such as the length of course hours, the attributes of the course to the students in the ET plan, and the number of students in the classroom may also be factors. Have a certain impact on the evaluation results. Therefore, this article establishes a classroom attribute mining model for teachers teaching, and analyzes the relationship between classroom related attributes and the evaluation results of ET quality in order to find relevant factors that affect the quality of ET.

(3) Data conversion
The data conversion process requires operations such as cleaning, data integration, data transformation, and data specification from different data sources.

1) Data cleaning mainly includes the following three aspects: the processing of missing values. The processing methods for the missing value in the source data mainly include ignoring the record, manually filling in the missing value, replacing with a constant (such as "unknown" or "none"), filling with the average value of the attribute, using and given record There are six ways to fill in the average value of all samples of the same kind, and fill in with the most likely value. Usually the most commonly used is the last method. Processing of noisy data: Noisy data is a random error of measurement variables, and the data can be smoothed by the surrounding average, clustering, manual inspection, regression and other methods. Treatment of inconsistent data: It can be corrected manually.

2) Data integration is mainly to combine and store data from multiple data sources in a data warehouse.

3) Data transformation is to transform data into a form suitable for mining, including data generalization, data standardization, and construction of new attributes.

4) Data reduction techniques, such as data cube drama, dimension reduction, data compression, numerical data reduction, and discretization, are used to obtain data specifications and minimize the loss of information content.

3. Experimental Research on College ET Evaluation System Based on Big Data

3.1 Experimental Data Source
The classroom ETQES has data for students to evaluate teachers, the teacher management information system has basic information data for teachers, and the comprehensive educational administration database has data such as course arrangements taught by teachers. The database of the classroom ETQES runs on SQL Server, the database of the teacher management information system runs on Visual Fox Pro, and the database of the integrated educational administration system runs on the Oracle database server.

3.2 Program Experiment Process of DM Module

(1) Select sample data
When ET managers use this module for association rule mining, the system first requires users to select the sample data required for DM. For example, you can select the evaluation data of the first semester of the 2018-2019 school year as the sample data for association rule mining, or you can choose the evaluation data of the 2018-2019 school year is used as sample data for association rule mining.

(2) Select the mining model and set the parameters
This paper establishes two association rule mining models, namely the teacher's personal factor mining model and the teacher's classroom attribute mining model. ET managers can mine the corresponding data by selecting different mining models, setting different minimum support, minimum confidence and other parameters.

(3) Association rule mining
Use the association rule mining algorithm to process the mining model with the parameters set by the user, generate frequent item sets from it, and then generate the association rules.

(4) Display association rules
The generated association rules are displayed to the ET manager in the form of a table. If no association rules are found in association rule mining, or the association rules found cannot meet the user's satisfaction, the user can re-mine by resetting relevant parameters or reselecting sample data.

4. Experimental Research and Analysis of College ET Evaluation System Based on Big Data

4.1 Relationship Between Teacher's Professional Title and ET Quality Evaluation Score
Set the JSLB, NLD, XB, ZGXW fields in the teacher personal factor mining model to "ignore", process the mining model, and obtain the relationship between the teacher's title and the ET quality evaluation score as shown in Table 1.

| Item set               | Support (%) | Confidence (%) |
|------------------------|-------------|----------------|
| ZC = Positive height> FSD = 95-100 | 7.4         | 37.5           |
| ZC = Elementary> FSD = 90-95         | 3.4         | 62.5           |
| ZC = Elementary> FSD = 85-90         | 2.6         | 43.9           |
Figure 1. Support and confidence of teacher's title and teaching quality evaluation score item set
It can be seen from Figure 1 that teachers with senior professional titles have higher student evaluation results, and teachers with junior professional titles have lower student evaluation results. This shows to a certain extent that the higher the teacher's professional title, the higher the degree of recognition by students of the high quality of the teacher's teaching.

4.2 Relationship Between Teacher Age and ET Quality Evaluation Score
Set the JSLB, XB, ZC, and ZGXW fields in the teacher personal factor mining model to "ignore", process the mining model, and obtain the relationship between the teacher's age and the ET quality evaluation score as shown in Table 2.

Table 2. Support and confidence of teacher's age and teaching quality evaluation score item set
| Item set | Support (%) | Confidence (%) |
|----------|-------------|----------------|
| ZC = Positive height> FSD = 95-100 | 10.5 | 73.4 |
| ZC = Elementary> FSD = 90-95 | 41.6 | 77.2 |
| ZC = Elementary> FSD = 85-90 | 4.3 | 45.5 |

Figure 2. Support and confidence of teacher's age and teaching quality evaluation score item set
It can be seen from Figure 2 that the 4555-year-old teacher received a higher student evaluation...
score, indicating that teachers of this age group are more popular with students.

5. Conclusions
This paper designs and implements the DM module of the ETQES, and applies it to practice. First, the data source is analyzed in detail, and relevant data is extracted from the database of the ETQES, the teacher management system, and the comprehensive educational administration system, and the data warehouse is constructed through data preprocessing. Secondly, the DM module is implemented with the association rule algorithm, and some association rules are discovered by mining the data in the data warehouse. For example, in the analysis of the relationship between teacher’s gender, age, professional title, educational background and other personal factors and student evaluation scores, it is found that the teacher’s gender is not necessarily related to student evaluation results; the higher the teacher’s professional title, the corresponding evaluation scores given by students Higher.

Acknowledgments
School-level research project of Hubei Polytechnic University "Research on The Basic Characteristics and Correction Methods of Inertial Fragmentation Reading of Non-English Major College Students from the Perspective of Big Data" Project. (No. : 2019C59)

References
[1] Liu G,Cai Q,Ren H . A Novel Fuzzy Evaluation Method on Teaching Quality of College English based on Preference Selection Index[J]. IOP Conference Series: Materials ence and Engineering, 2020, 806(1):012037 (4pp).
[2] Wang B , Wang J , Hu G . College English Classroom Teaching Evaluation Based on Particle Swarm Optimization – Extreme Learning Machine Model[J]. International Journal of Emerging Technologies in Learning, 2017, 12(5):82.
[3] Guo J , Yu S . Evaluation Model of College ET Quality Based on Big Data Analysis[J]. IOP Conference Series: Materials ence and Engineering, 2020, 750(1):012077 (7pp).
[4] Lu X.An Empirical Study on the Artificial Intelligence Writing Evaluation System in China CET[J]. Big Data, 2019, 7(2):121-129.
[5] Yang Y . The Implementation Strategies of Cultivating Socialist Core Values in College ET[J]. Creative Education, 2018, 9(12):1829-1834.
[6] Zhang Y.Study on the application and design of ARCS model in college ET[J]. Revista de la Facultad de Ingenieria, 2017, 32(15):234-239.
[7] Zhang S.A research on the construction of computer aided college ET system based on ecological teaching[J]. Revista de la Facultad de Ingenieria, 2017, 32(11):359-364.
[8] Tian D,Lu Y.A Study on Critical Thinking Assessment System of College English Writing[J]. English Language Teaching, 2015, 8(11):176.
[9] Peng N,Yang G,Wang K,et al.The Construction of an Evaluation System for the Post Competence of College Foreign Language Teachers Based on Computer Big Data Technology[J]. Journal of Physics: Conference Series, 2020, 1578(1):012041 (5pp).
[10] Zhao X.Mobile ET System Based on Adaptive Algorithm[J]. International Journal of Emerging Technologies in Learning (iJET), 2018, 13(8):64.