

The Teaching Evaluation System of College Students under the Background of Big Data

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Abstract: How to use massive data to analysis of the school's diversified real teaching achievements has become a fundamental problem in the teaching work of major colleges. The purpose of this paper is to study the teaching evaluation system of college students based on big data. It is proposed to use data mining in the current evaluation system. It briefly expounds the research status of data mining technology, introduces the construction method and construction principle of the entire teaching evaluation system, and proposes a data mining based on Apriori algorithm. This method is used to construct a teaching evaluation system for college students, which solves the problem of weight distribution rating index. Finally, the construction process is explained through the establishment and analysis of examples. This paper outlines how to use association rules to scientificity of the evaluation system, discusses the rules in the analysis of evaluation results, and deeply analyzes the meaning of the results.

Keywords: Big Data Background, College Students, Teaching Evaluation, Evaluation System

1. Introduction

University education is one of the important components of my country's current education, an important symbol of my country's modernization development, and the cradle of my country's talent training [1-2]. The level of development will be an important symbol that determines the prosperity and strength of a country [3]. At present, the employment problem in our country is relatively prominent, the talents trained cannot meet the needs, the quality of university education is not optimistic, and the current situation of university education development is far behind the national economy and society. Society has put forward higher requirements for the teaching quality of schools [4-5].

There are not many studies on the teaching evaluation system of Chinese schools [6]. Tan P discusses multidisciplinary assessments and study plans in English. The first part is a database that contains multiple databases where different levels of access data and test requirements are stored at different levels. The second part is a serial number with a single password, which creates a login view for the user account record and password. The access module is electronically connected to the database system so that the module can verify the registered account and password against the access data stored in the database [7]. Yanmei T analyzes a quality assurance system based on a mathematical model of teaching effectiveness. The hierarchical relationship and vector density of the teaching index system are determined by the hierarchical process, and the perfect assessment is achieved through the general work of illiterate practitioners who have developed the integrity of the quality assessment training system. Along with a deep understanding of teaching and learning, the assessment system also has good implementation expectations and promotion value [8]. The research on the quality of teachers and the research on students' learning motivation is tantamount to helping teaching evaluation. Teaching evaluation has become an important tool in academic research [9-10].

This paper collects the evaluation data of 12 teachers, explores the construction of an index system for process evaluation supported by educational big data, forms a teaching evaluation method for process evaluation, and analyzes the relationship between evaluation data and the overall evaluation results. The Apriori algorithm is applied to the analysis of the evaluation results, which strengthens the control of the training process, and solves the problems of learning process management and quality evaluation to a certain extent; the course evaluation system also provides an Internet of Things environment for the database of the university education system.

2. Research on the Teaching Evaluation System of College Students under the Background of Big Data

2.1 Construction Principles

(1) Pay attention to the dynamic nature

The developmental principle is an important premise for constructing a developmental evaluation system, and it is also a guiding and guaranteeing principle to promote the personal development of teachers and the professional development [11-12]. According to the philosophical principle that things are always in motion, change and development, the same is true of teachers' teaching activities. This requires that teaching evaluation institutions and related personnel should first treat teachers' teaching work from a developmental perspective when conducting evaluation activities. Based on the particularity of teachers' work, it is not possible to use a fixed assessment cycle to assess teachers' teaching performance. Properly extend the assessment cycle and conduct teaching evaluations after teachers' teaching effectiveness has emerged. The evaluation results obtained are higher than those obtained in the fixed assessment cycle. It is more persuasive and easier to be accepted by the teachers being evaluated [13-14].

(2) Pay attention to the difference

Teaching work can also be said to be an art. When evaluating teaching, unified evaluation standards and norms are used to constrain teachers' teaching. Teachers' teaching effects vary according to their disciplines, ages, professional titles, etc. The indicator should take into account the differences of teachers' teaching as much as possible [15]. Developmental teacher evaluation advocates that teachers' teaching should be individualized. On the basis of studying traditional teaching models, teachers should be able to continuously innovate their own teaching styles, which can be accepted and recognized by the majority of students. Therefore, in addition to formulating teaching plans and systematically teaching basic curriculum knowledge, teachers can use their thinking mode to guide and inspire students, infect students through their own personality charm, guide and stimulate students' emotions, and establish a strong personality for students. A good role model, which not only enables the development of students' personalities, but also promotes the improvement of teachers' self-cultivation [16-17].

2.2 Construction Method of Evaluation System

Teaching evaluation activities always make value judgments on the attributes being evaluated based on certain goals. Regardless of the construction of any evaluation system, the index weight are the two most important tasks. The teaching evaluation index is the setting of the goal, one is to reflect the essential characteristics of the goal in specific aspects; the other is the behavioral goal, which is specific and functional; the third is to pass the real observation and measurement [18].

The scoring system is a complex, multi-layered system used to solve related problems of the same kind. A scientific and reasonable teaching evaluation system can provide educational managers with decision-making basis, such as teacher adjustment, teaching reform, etc.

2.3 Apriori Algorithm

Apriori adopts an iterative layer-by-layer search method, using k items to search $(k+1)$ datasets. Initially, by searching the database, the number of each item is collected, and the set of common items is found according to the minimum support. Then, 1 dataset is often used to find common 2 datasets, and so on, until no more k elements can be found. To find each set of k elements, the entire library is searched. If a dataset does not meet the minimum support threshold, then this dataset is infrequent and a superset of this dataset cannot be frequent.

Algorithmic process:

(1) Connection step: To find L_k , perform the connection function through L_{k-1} to create a candidate set of K elements, called C_k . Conditionally chain and create distinct candidate k elements.

(2) Pruning step: C_k is a superset of L_k , that is, all frequent k elements are included in C_k . Essentially, if the subset of $k-1$ elements of k objects is not in L_{k-1} , then the candidate is also unlikely to be frequent, ie any subset of the set of candidate C_k elements does not belong to the set of $k-1$

frequent elements, Then the item cannot be a frequent itemset and can be deleted in Ck.

(3) Number of supports: Scan the database and measure frequent datasets according to the minimum amount of support.

3. Investigation and Research on the Teaching Evaluation System of College Students under the Background of Big Data

3.1 Data Preparation

Based on the electronic campus environment, according to the established evaluation indicators of higher vocational colleges, teachers' teaching evaluation data are collected from experts, peers and students, and then the evaluation data of 12 teachers are randomly selected from the collected data. The correlation between the evaluation data corresponding to each index and the overall evaluation results is analyzed, and the weight distribution is verified through the degree of action and confidence. If u_i is used to represent the i scoring index, and t_j is used to represent j teacher. When the weight of the scoring indicators is clear, all scores are quantified as follows: poor \Rightarrow 45, successful \Rightarrow 65, moderate \Rightarrow 75, good \Rightarrow 85, excellent \Rightarrow 95. Total score The evaluation score obtained is mainly divided into three intervals, through the distinction rule "[70, 80) \Rightarrow medium, [80, 90) \Rightarrow good, [90,100] \Rightarrow excellent, the total evaluation score can be obtained.

3.2 Association Rules

Let $I = \{i_1, i_2, \dots, i_m\}$ be the sum of all elements, $D = \{t_1, t_2, \dots, t_n\}$ transaction database I , transaction $T = \{i_1, i_2, \dots, i_k, \dots, i_n\}$. If X is a set of elements, it is called an element set; if an element set X contains k elements, it is called k elements.

Definition 1: The percentage of transactions in D that contain dataset X is called the support of the dataset. Expressed as:

$$Support(X) = \frac{|X|}{|D|} \times 100\% \quad (1)$$

Where: D : the number of transactions in transaction database D , and X : the number of transactions in itemset X .

If $support(X)$ is greater than the minimum support given, the itemset X is called a frequent itemset; otherwise, X is an infrequent itemset.

Definition 2: The credibility of association rule $X \Rightarrow Y$ is:

$$Confidence(X \Rightarrow Y) = \frac{sup\ port(X \cup Y)}{sup\ port(X)} \times 100\% \quad (2)$$

Among them: item set $X \cup Y$ is also called the support degree.

4. Analysis and Research of College Students' Teaching Evaluation System under the Background of Big Data

4.1 Construction of Teaching Evaluation System

The first-level indicators of the undergraduate teaching evaluation system include teaching objectives, teaching content, teaching methods, teaching attitudes, teaching effects and teaching research, as shown in Figure 1. Each primary indicator can be subdivided into secondary indicators. Until all indicators form an overall evaluation system.

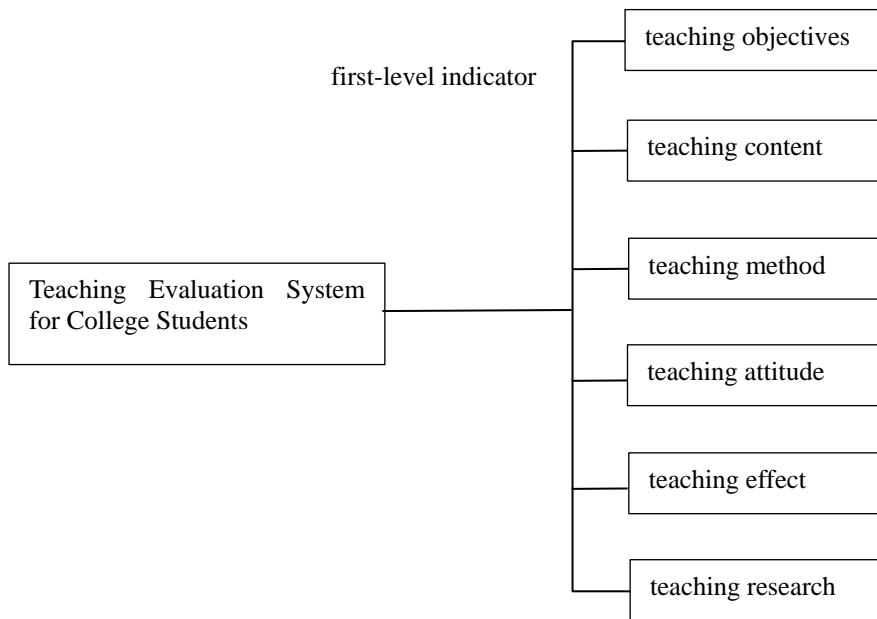


Figure 1: Primary indicators

This paper constructs a very comprehensive system of teaching evaluation for college students. In this evaluation system, there are 6 first-level, which fully reflect the teaching level. The evaluation system has the characteristics of scientificity, completeness, orientation and feasibility, and fully conforms to the basic principles of establishing the system. The index system in each module of the evaluation system is different according to the characteristics of the evaluators. For example, the evaluation of teaching is very important in the evaluation of students, but there is no effect in the peers, experts and leaders, because only students can deeply appreciate the "good" and "bad" teaching effect. But there are also some core evaluation indicators that should be consistent in each system, such as whether the teaching attitude is correct, whether the teaching method is flexible, etc. Therefore, there are many identical evaluation indicators between modules. However, the weights of these indicators may also be different due to the characteristics of the participants, but this difference is subtle, in order to uniformly process the evaluation data and conduct research on this basis.

4.2 Analysis of Evaluation Results Based on Association Rules

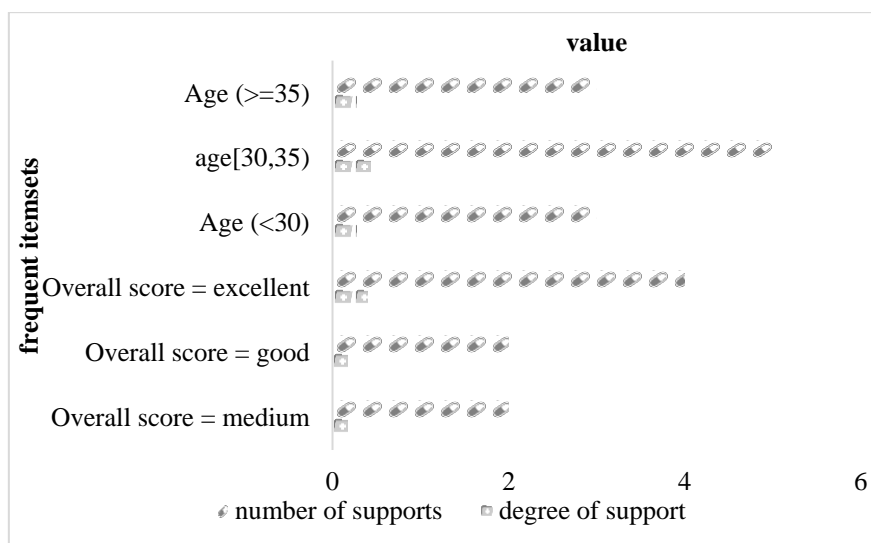


Figure 2: Support for each itemset

Analyze the relationship between evaluation results and age: Using the data in data preparation, age is divided into the following three levels (≥ 35), (< 30), $[30, 35)$, and the overall evaluation results are

excellent, good, and neutral. Poor, use the Apriori algorithm to process the data to get the association rules. The minimum support is 0.1, the support of each item set is as Figure 2:

If the minimum confidence level is: 0.2, the confidence level of each rule is calculated by using the confidence level algorithm as follows:

Table 1: Confidence calculation rule results

Association rules	Confidence
Age (≥ 35) overall score = excellent	0.68
Age[30,35) Overall Score = Medium	0.57

The above results show that teachers over the age of 35 have higher reliability for the corresponding courses they teach to get excellent evaluation grades. This result can explain to some extent that with the increase of age, the teaching experience is also richer.

There is also a relatively high correlation between the comprehensive assessment results and teachers' academic qualifications. The courses taught by graduate teachers are rated as excellent, indicating that a large number of highly educated talents have been introduced into the department, which ensures the quality to a large extent and is also recognized by the students. The evaluation level of each course taught by teachers with a degree is moderate, which shows that the introduction of high-quality talents is important to ensure the teaching quality. Therefore, the introduction of highly educated talents is the most convenient and effective way to improve the overall teaching level.

5. Conclusions

The calculation of college students' teaching evaluation system based on big data may involve a variety of behaviors. At the same time, students are independent individuals, and the results of teaching evaluation may be related to various aspects. Due to the limited ability and time of individuals, the research in this paper still has some problems. The shortcomings need to be further improved and supplemented in the future. (1) The construction of system mainly emphasizes the explicit factors of teachers, but students' learning is not only affected by these factors, but also considers students' learning styles, study habits, and cognitive habits. The evaluation indicators should further reflect the students' Personal learning characteristics. (2) At present, the next step is to propose a more effective calculation method for students' learning data.

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