

Comprehensive analysis of students' performance based on student comprehensive analysis model

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ABSTRACT. *College Students' curriculum achievement is an important index to measure their comprehensive quality, which can also reflect the quality level of higher education and teaching. How to improve the comprehensive quality of students and significantly enhance the competitiveness of the university has become the focus and difficulty of the education and teaching work in Colleges and universities. In this paper, with the help of big data, data mining technology, building a learning behavior model, which can comprehensively analyze the characteristics of students' group learning behavior, and formulate personalized education and teaching assistance programs for different student groups to help students improve their learning ability.*

KEYWORDS: *students' performance, comprehensive analysis model, Colleges*

1. Introduction

With the rapid development of big data technology and artificial intelligence, more and more industries use these information technologies to solve practical problems and achieve good results, there are still practical problems in how to make a comprehensive analysis of students' achievements and explore their learning characteristics, for a long time, a large number of students' learning performance data have been accumulated in the process of college education and teaching. However, the characteristics of students' group learning and the relationship between the courses they study have not been fully utilized and analyzed. Through data mining and artificial intelligence technology, we hope to find out the potential

factors that affect students' group learning and the learning characteristics of different groups of students. According to different groups of students, we hope to develop personalized education and teaching training programs to help students improve their individual learning ability and achieve the purpose of improving the quality of school education and teaching.

With the continuous development of information technology, more and more information systems are applied in the daily teaching and management of students, the data related to students' learning and life are recorded, which integrates the big data about students' education. If we can't get too much valuable information only through simple statistical analysis of students' academic achievements, we can systematically guide students' performance management by using cutting-edge technologies such as artificial intelligence, and find out the potential factors that affect students' academic performance, as well as the correlation between various courses, such as whether the quality of basic courses affects the learning of subsequent courses, And the influence of students' gender, interests and hobbies on their academic performance. All of these work need us to do deep analysis and mining to the student achievement data set, so as to get more valuable information about students, and assist the educational administrators to optimize the curriculum setting. To provide reference and basis for improving teaching quality, we need to find an innovative and more efficient analysis method of student achievement.

2. Related work

In order to analyze and explore the learning characteristics and habits of different student groups, some scholars use clustering algorithm to cluster students with similar learning habits and hobbies into a cluster [1]. Through the analysis of visual K-means clustering algorithm [2], the obvious differences in learning habits and hobbies of different types of students can be compared. For different groups of students, teachers can formulate teaching plans to improve the overall learning level of students. This way can significantly improve students' learning enthusiasm, but there is no unified scientific standard in dividing the number of student groups[3], setting different number of student groups will inevitably lead to different student groups, In order to find out the potential factors that affect students' academic performance and realize the early warning of students' curriculum performance,

scholars use association rule algorithm to analyze students' curriculum performance [4], and mine the relevance between courses and the valuable information hidden in the course scores, so as to provide realistic basis and quality assurance for teaching plan arrangement, The hybrid algorithm based on association rules and decision tree has a good effect in analyzing the impact of courses and students' basic information on the follow-up learning results, and has a high accuracy rate in predicting and warning students' grades [5]. With the rapid development of computer hardware, the neural network[6] has developed from single-layer perceptron to multi-layer network, and the improvement of neural network is better than that of hardware innovation More performance gains, JIN Xiuling [7] optimizes SVM model parameters through GA and establishes GA-SVM student achievement prediction model. Course performance is an important indicator to measure the quality of teaching in Colleges and universities, ZHUANG QiaoHui [8] proposed an improved random forest algorithm combined with annealing algorithm. The improved algorithm has great advantages in feature selection and parameter optimization [9]. It can accurately predict the future academic performance of classified students through students' previous course performance.

In order to complete the accurate analysis of students' learning situation, scholars from the initial use of statistical methods to classify and count students' academic performance to use association rule algorithm to mine the potential association between courses. By specifying targeted teaching methods, students' group performance can be improved as much as possible. With the development of prediction classification algorithm, some students predict students' performance based on improved classification algorithm these methods help students to improve their academic performance to a certain extent, but there is no unified measurement standard to compare the degree of students' academic progress. In this paper, through the dynamic analysis of the average academic performance of student groups, and comprehensive analysis of different characteristics of student groups, we specify no teaching methods, and calculate students' academic performance according to the unified measurement standard Progress.

3. Comprehensive analysis model

Here we propose a basic indicator student achievement benchmark e ,

$$e = \frac{1}{n} \sum x_i \quad (1)$$

x_i stands for student's personal achievement and n represents the total number of students, which can represent the basic state of students' learning, in addition, we use the student learning index ε to indicate the quality of students' learning,

$$\varepsilon = \frac{x_i - e}{X - e} \quad (2)$$

X represents the full score of the course), and the course weight ratio θ , it represents the importance of the course, usually we use credits or class hours to measure the importance of the course,

$$\theta_i = \frac{f_i}{\sum_{i=1}^N f_i} \quad (3)$$

f_i is the credit of the course and N is the total number of courses, According to the user-defined three parameter values, we can draw the weighted average student score data

$$\delta_i = \varepsilon x_i \theta_i \quad (4)$$

Students' weighted average total score is,

$$g = \sum_{i=1}^N \delta_i \quad (5)$$

We collect the data of students majoring in computer science and technology in Computer College, and recalculate students' scores by weighted average score. The experimental results are as follows, first of all, we have obtained 30 scores of students from computer science 181 class, taking the professional course scores of students in the first semester of 2019-2020 as an example,

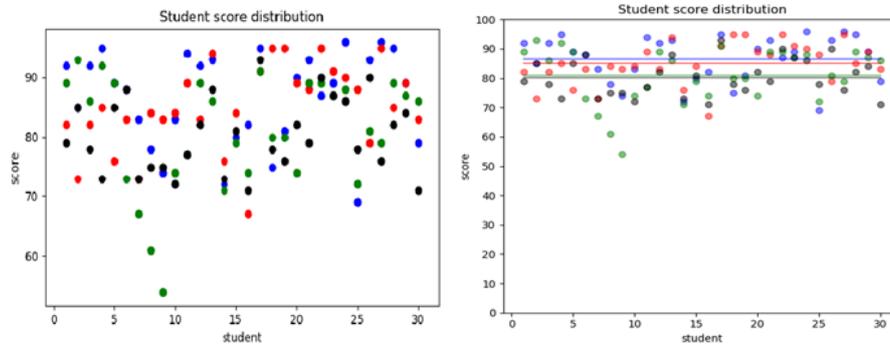


Figure. 1 Score distribution

Four different colors in figure 1 represent four different courses, and four different straight lines represent the average scores of the four courses, which are calculated according to formula (1), as well as according to the formula (3)(4)(5) calculate the weighted average score of students' scores

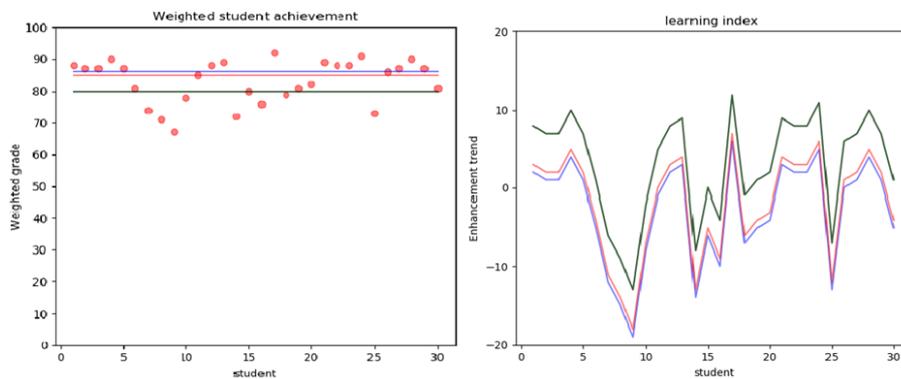


Figure. 2 Students' weighted achievement and learning enhancement

4. Conclusion

Through the comparison between Figure 1 and Figure 2, we find that the students whose scores are much higher than the highest average score standard are

the best and have obvious enhancement trend, while the students who are far below the average score have poor academic performance and have a more obvious downward trend.

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