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Student Interest Mining Model for Classroom Teaching based on Artificial Intelligence Method

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Abstract: *Based on the characteristics of higher vocational education and the specific implementation process of classroom teaching, we introduce artificial intelligence method into the classroom teaching process of higher vocational education. The clustering method is determined to be an effective method for student interest mining, and the specific application of k-means method in student interest grouping is studied. An interest mining model is established. Taking tourism course as a case study, a classroom teaching model is designed by student interest grouping, providing decision-making reference for teachers to organize and implement seminar classes. At the same time, in the process of constructing clustering method to achieve student grouping and organize teaching, teachers should reflect on the teaching mode, clustering model, teaching process, etc. in a timely manner, and evaluate the clustering model to ensure that the constructed clustering method and model can correctly output grouping results and ensure the accuracy of student interest matching.*

Keywords: *Artificial intelligence, Classroom teaching, Student interests, Clustering method, Model evaluation*

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I. INTRODUCTION

Higher vocational education emphasizes the cultivation of students' thinking ability and problem-solving skills. Different from ordinary higher education, the curriculum design of higher vocational education should focus on solving practical problems, strengthen the proportion of exploration and discussion, fully integrate students' interests, explore students' independent innovation ability and logical thinking ability, and comprehensively improve students' comprehensive quality. In instructional design, the cultivation of students' ability to solve practical problems must be based on their interests, combined with teaching needs and social industry demands. The focus of classroom teaching should be on students discovering, researching, discussing and solving problems. Therefore, how to use information technologies such as artificial intelligence and data mining to deeply explore students' interests, combine students' interests and innovative consciousness with social industry needs and socio-economic development needs, match them with the teaching process of higher vocational education, and guide students to master the skills of solving practical problems, is the key to curriculum design in higher vocational education.

Before teaching, teachers need to design specific teaching materials from the perspective of students' interests based on the classroom teaching contents. The designing classroom teaching contents that fully combines students' interests can greatly improve their classroom enthusiasm, especially in practical teaching activities. For group discussions on teaching topics, group research on discriminative problems, group analysis of solutions, etc., it is necessary to group students in the class, and the important criterion for grouping is the students' interests. Therefore, studying the student interest mining model for classroom teaching under artificial intelligence conditions for student interest grouping plays an important role in teachers' class preparation, classroom teaching and implementation, and post-class summary and reflection. In the research work, we design a method for mining students' interests by using artificial intelligence technology. This method can cluster students according to their interests and group them based on the clustering results. Teachers can design specific teaching and discussion content for each group according to the grouping situation, promoting students to participate in classroom teaching according to their own interests and improving classroom enthusiasm and teaching effectiveness.

II. RESEARCH METHODS

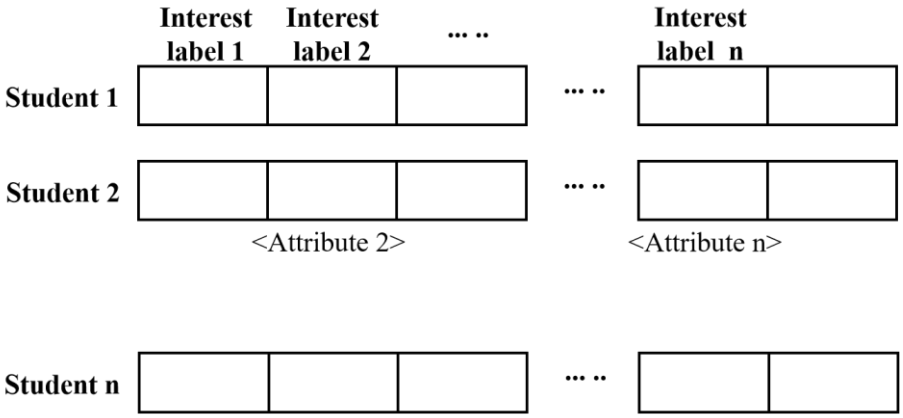
1.1 **Selection of Artificial Intelligence Method**

There are many technologies involved in artificial intelligence, including data mining methods, machine learning methods, intelligent computing methods, etc. When mining students' interests, their interests are uncertain, and because the teaching content of each class is different, there is no clear reference standard for grouping students' interests. This situation is in line with the application scenario of clustering method in data mining, namely unsupervised learning method. For the process of collecting student interests with strong randomness, teachers can use clustering method to design student interest labels, collect data, and implement clustering, achieving unsupervised grouping of student interests. There are many types of clustering methods, such as hierarchical clustering methods, partitioning methods, density based methods, model-based methods, etc. Based on the characteristics of students and their understanding of teaching content, we choose a relatively simple partitioning method to achieve clustering. Among the partitioning methods, *k*-means method is a common model that dynamically determines the structure and elements of clusters by continuously selecting the optimal cluster center points, and finally outputs the results when reaching a stable state.

1.2 **Design of clustering method**

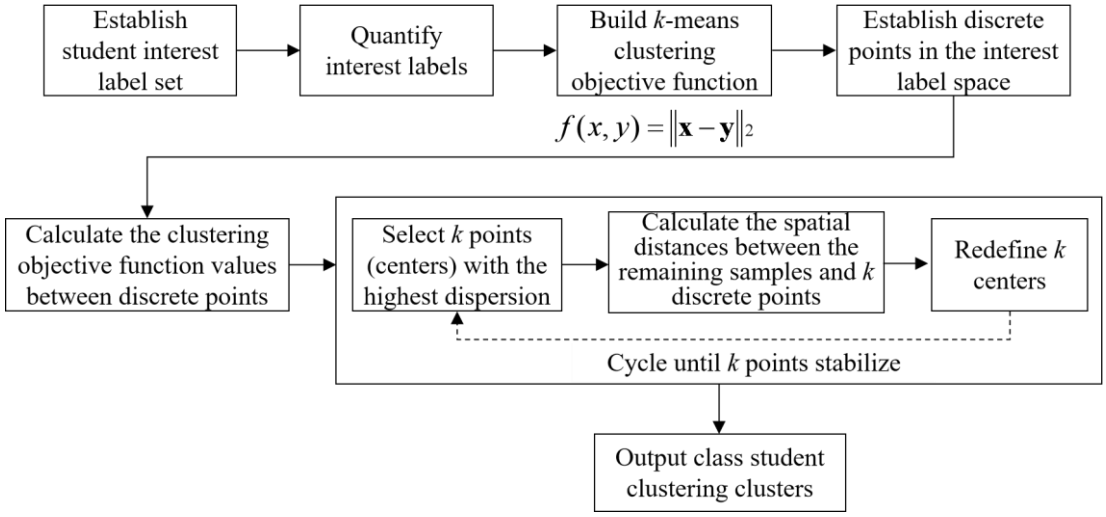
When designing clustering method, we firstly use the Chaoxing Learning Platform used in the teaching process to establish student interest labels, then design interest label attributes, and quantify the interest labels to generate the structured data that can be used to construct *k*-means method. There are several factors to consider when establishing interest labels, including: First, the course standard and the theoretical teaching content; Second, social industry needs and socio-economic development demands; Third, students' actual cognitive situation. The constructed interest labels have clear differentiation and can cover course attributes and all student interests, making it easy to collect data. Figure 1 shows the constructed interest label collection model, which is used to collect the interests of students in the class, and based on this, a *k*-means method is established.

Figure 1. The constructed interest label collection model



On the basis of establishing student interest labels, we treat each student as a discrete point in space, and each point has label attributes. We use the interest labels to construct a *k*-means clustering objective function. The clustering objective function calculates the intimacy relationship between label attributes of two students, and determines the point with the lowest intimacy as the screening condition for cluster center. When *k* number of cluster centers are selected, the point with the highest degree of closeness to the cluster center among other non center points is included in the range of the cluster. Follow this step to reselect the center, and then add other non center points to the cluster in the order of intimacy. Cycle this process until all center points are stable and no longer change. Output the cluster results. Figure 2 shows the process of outputting clusters by using the *k*-means method based on student interests.

Figure 2. The process of outputting clusters by using the *k*-means method based on student interests.



1.3 **Construction of classroom teaching mode based on student interest mining**

The constructed *k*-means clustering method provides a scientific and quantitative basis for teachers to design and discuss classroom teaching topics and group discussion content, and the clustering results clarify the interest tendency of each team. Design a quantitative scoring table based on teaching objectives to further quantify the interest level of each group. The interest quantification scoring table for the design is shown in Table 1. Taking the "Rural Tourism Industry" of the "New Tourism Industry" course as an example, the theme of "Rural Leisure" was selected for scoring. The higher the score in the table, the higher the level of preference. Based on the scoring results, teachers combine social industry needs, curriculum standards, teaching content, and grouping results to design a matching model between interest knowledge and student teams. Based on the quantified scoring values of team interests, they design biased discussion topics and assign them to each group. Design discussion contents for different interest groups based on the same topic, with teachers guiding questions and students conducting independent explorations and discussions, or students proposing different decision-making plans. Finally, the entire class and teachers will jointly grade each group. By organizing interest group discussions, we can fully stimulate students' enthusiasm, achieve the personalized teaching and encourage "a hundred schools of thoughts to compete".

Table 1: Quantitative interest rating table designed by teachers based on teaching objectives and content (including quantitative interest label rating for "Rural Leisure")

Question: You have signed up for a tour group and today's itinerary is to visit and explore Hongcun, Anhui. Which leisure activity do you like the most? Please create a simple questionnaire.
A. Appreciate the beautiful scenery. □10 □9 □8 □7 □6 □5 □4 □3 □2 □1
B. Take photos and check in. □10 □9 □8 □7 □6 □5 □4 □3 □2 □1
C. Taste delicious food. □10 □9 □8 □7 □6 □5 □4 □3 □2 □1
D. Experience farming. □10 □9 □8 □7 □6 □5 □4 □3 □2 □1
E. **... ...**

1.4 **Classroom teaching reflection and method evaluation**

Regarding the design of student interest labels, *k*-means class clustering, student interest mining and knowledge discovery, and discussion classroom teaching, the teachers should reflect on the discussion course design and teaching process in a timely manner, summarize the problems in the teaching process, optimize and improve the integration of artificial intelligence classroom teaching and *k*-means clustering methods to achieve class grouping, and improve the accuracy of interest mining and class grouping. At the same time, teachers should conduct in-depth analysis of classroom discussion topics, study the practical problems that exist in the implementation process of discussion courses, and optimize them in a timely manner to ensure the teaching implementation effect and teaching quality.

In the process of constructing clustering method for student interest data mining, it is necessary to quantitatively evaluate the clustering method to ensure that the constructed clustering method and model can correctly output grouping results and ensure the accuracy of student interest matching. For the *k*-means clustering method, the most commonly used evaluation methods are internal evaluation methods and external evaluation methods:

(1) Internal evaluation methods: including squared error sum evaluation, contour coefficient evaluation, DB index evaluation, etc;

(2) External evaluation methods: including purity evaluation, F-value evaluation, Jaccard coefficient evaluation, etc.

Through quality evaluation methods, teachers can adjust the grouping in the teaching implementation process in a timely manner. When there is an individual student in the group generated by clustering method whose interests do not match those within the group, teachers can consider the student as special student and conduct separate assessments and inquiries about his interests. Based on personalized judgment, the specific interests of the student can be determined and included in the corresponding group.

III. CONCLUSION

In response to the teaching characteristics and classroom teaching process of higher vocational education courses, we introduce artificial intelligence methods into higher vocational education course teaching, and use data mining method in artificial intelligence methods to construct a student interest mining model. Based on the analysis of the characteristics of students' interests, taking the randomness and lack of reference of students' interests as the modeling basis, it is concluded that clustering method is suitable for the unsupervised student interest mining. Therefore, we construct a student clustering model based on the *k*-means method, design student interest labels based on course teaching objectives and contents, and quantify the labels. By establishing a clustering objective function, the *k*-means method is used to determine the standard of student interest intimacy. In the process of constructing clustering method to achieve student grouping and organize teaching, teachers should reflect on teaching modes, clustering models, teaching processes, etc. in a timely manner, and evaluate the clustering model to ensure that the constructed clustering method and model can correctly output grouping results and ensure the accuracy of student interest matching.

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