Research Paper

Research on the E-commerce Course Evaluation System Based on Data Mining Technology

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ABSTRACT: *With the expansion of university enrollment in China, the demand for teaching and curriculum reform in universities has become increasingly strong. To comprehensively and systematically complete course assessment and analysis and decision-making, it is necessary to utilize the development of artificial intelligence technology in recent years. In response to the drawbacks of traditional course assessment methods, this study adopts data mining technology to sort, transform, mine and analyze the data collected through multi-dimensional data entry, and establishes a data collection and mining analysis evaluation platform. This platform solves the problems of low assessment efficiency, lagging nature, and excessive proportion of examination scores in traditional course assessment, improving the efficiency of course assessment from both the teacher's and student's perspectives. It achieves the deep integration of course assessment goals and artificial intelligence technology, providing beneficial development ideas for the Intelligence-driven of course assessment in the new era.*

KEYWORDS: *Data mining, Course assessment, Artificial intelligence*

I. INTRODUCTION

With the expansion of enrollment in China's universities, the number of majors has also increased. The teaching and curriculum construction in universities have entered a period of vigorous development. The demand for teaching and curriculum reform in universities is also growing stronger. As the main body of curriculum construction, university teachers need to comprehensively and systematically complete the assessment and analysis of courses and make decisions, which is an important link to achieve reform. In recent years, the development of artificial intelligence technology has brought new ideas for the scientific and systematic assessment of courses. The high efficiency, refinement, and objectivity of artificial intelligence can effectively alleviate students' anxiety about the content, form, and results of course assessment. Correspondingly, as the main body of the design and implementation of course assessment methods, teachers should give full play to the technical advantages of artificial intelligence, combine their own understanding of the courses they teach, establish assessment methods and decision-making frameworks suitable for the characteristics of the courses, and build convenient models and platforms for implementation, gradually bringing course assessment onto the track of automation, rationalization, and objectivity.

This study attempts to explore the establishment of a brand-new course assessment system based on data mining technology [1] in the field of artificial intelligence and applied to e-commerce courses. In light of the main objective of e-commerce courses, which is to cultivate high-quality laborers and skilled talents with all-round development in morality, intelligence, physical fitness, and aesthetics, and capable of engaging in online marketing, online store editing, customer service, and other work through e-commerce platforms, the introduction of artificial intelligence technologies such as data mining and big data analysis can comprehensively reduce teachers' repetitive work while making the assessment more precise, scientific, and objective. Under the new assessment system, students' comprehensive abilities can be fully reflected, and their learning activities can be comprehensively evaluated from multiple dimensions such as learning attitude, learning foundation, and learning effect. Through the accumulation of data and feedback from the decision-making system, suggestions for improvement can be provided to teachers in a timely and rapid manner without

increasing their workload. This enables teachers to achieve precise evaluation, real-time improvement, and efficient implementation.

II. THORETICAL BASIS FOR THE APPLICATION OF DATA MINING TECHNOLOGY IN THE COURSE EVALUATION SYSTEM

The establishment of an evaluation system based on artificial intelligence technology can enable the teaching evaluation of e-commerce courses to enter a long-term track of improvement and refinement. [2] From the perspective of people, through emotional education, it can stimulate students' subjective initiative, encourage them to learn actively, emphasize the student-centered approach in the teaching process, and make students become the masters of learning. Because every student is independent and has learning potential, teaching is to bring out these inherent potentials of students, acknowledging the uniqueness and differences of individuals. However, everyone also has the opportunity to make their own choices and judgments. Through a more reasonable and scientific evaluation system, in the teaching process, students' ingenious ideas and creativity are accepted, and they are encouraged to think critically and question, so that students maintain a strong interest and a high motivation level. This avoids the uncertainty of evaluation results caused by changes in teachers. Students will be more confident when facing course evaluations, pay more attention to their own learning and the acquisition of knowledge in the course, and reduce the influence of subjective factors and human factors brought by teachers' evaluations, adapting to the demands of the times. The discussion of learning theories is always combined with practice.

Through the evaluation system of e-commerce courses built by AI technology, teachers and students are combined as a community to participate in the learning of a practical community together. Both expand from the traditional teacher-student relationship dominated by teaching and learning to become members of a complete learning practice community [3]. They have both the teaching and learning relationship in the teaching process and the interest community relationship through the evaluation system to improve the course and enhance the teaching quality. Thus, it reduces the opposition consciousness between teachers and students in the evaluation process and improves the win-win consciousness. Through the interaction in this practical community, both teachers and students fully participate in all activities of the community, and gradually master skills and acquire knowledge through imitation, interaction and re-creation. Eventually, a relevant or realistic environment is constructed, allowing students to independently explore knowledge, enabling teachers to independently improve teaching, identify problems and solve them, and combine learning with application, improving the construction efficiency of e-commerce courses [4]. Deeply integrate the specific rules of e-commerce courses and artificial intelligence technology to achieve targeted and precise evaluation.

III. RESEARCH CONTENT

The data mining technology based on artificial intelligence is developing rapidly. The utilization and analysis of historical data is one of the significant benefits brought by the Internet. Specifically, in the evaluation of e-commerce courses, by making good use of historical and current data, the evaluation system can become more objective, efficient, and accurate. The main research content of this study is to establish a course evaluation system based on artificial intelligence for e-commerce courses [5]. The entire evaluation system consists of an evaluation platform, which includes two major modules: the teacher teaching module and the student learning module [6]. Each major module is further divided into multiple sub-modules according to the requirements.

In the teacher teaching module, there are student basic evaluation module, classroom effect evaluation module, post-class learning effect evaluation module, credibility analysis module for examination and test results, and comprehensive analysis and improvement suggestion module. A complete data input entry is established. Facing a large number of students and massive historical data, the system should have functions of data organization, analysis, and mining. It should extract necessary and targeted data from the original data, eliminate false information, and be targeted. According to the characteristics of the course, it should quickly mine reliable and accurate data [7]. While achieving detailed data analysis, it should also ensure the completeness of the entire course data analysis [8]. It should analyze both the longitudinal historical data and the current data of different classes and teachers. Through the entire connected closed-loop analysis, it should provide readable improvement suggestions.

In the student learning module, there are self-learning basic evaluation module, self-awareness evaluation module, learning goal analysis module, and learning effect analysis module. Students can establish reasonable learning goals based on the timely feedback and analysis of data, understand their own learning deficiencies, and make timely improvements and continuous progress [9]. Through the system's reminders and suggestions, it can achieve deep interaction with teachers, making teaching and learning two behaviors a unified whole.

IV. CONSTRUCTION OF EVALUATION SYSTEM PLATFORM

The main objective of building the evaluation system platform is to establish a complete course evaluation system for e-commerce courses based on artificial intelligence. The evaluation and analysis will be conducted from both teaching and learning perspectives, providing reasonable suggestions for improvement, and enhancing teaching quality and effectiveness. The system diagram of the platform is shown in Figure 1.
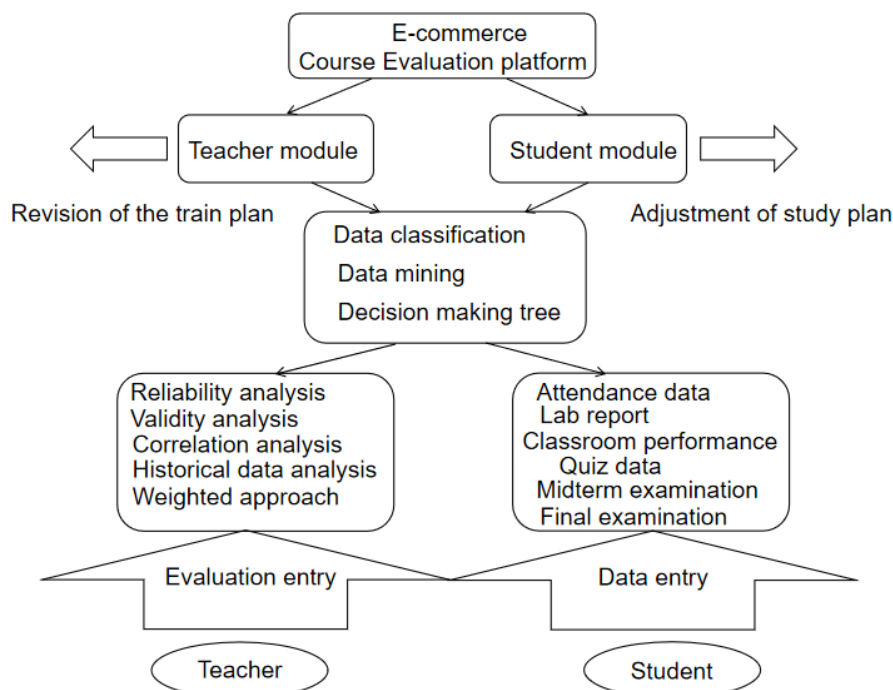

Fig.1 E-commerce Course Evaluation Platform

The entire platform is composed of two major modules: the teacher module and the student module. Among them, the main function of the student module is to obtain data, which is divided into several different data collections as the data entry point. The main function of the teacher module is to evaluate and categorize the data. The data and information collected by the two entry points are input into the data mining platform, where they undergo unified data organization, data classification, decision tree mining, and other summary and analysis processes. The functions of each part of the platform are described in detail below.

4.1 Data Entry

The data entry is mainly connected with students and is responsible for data collection. These data include the attendance data during regular classes, which can be either direct electronic data (nowadays, QR codes can be set up in classes, and students can sign in by scanning the code during class), or the paper-based data statistics after the teacher's roll call. It is recommended to combine this with digital classroom software in classrooms with conditions, allowing students to sign in by scanning the code, which can not only ensure the timeliness and effectiveness of the data but also reduce the workload of the teachers' statistics. Experimental report data, students can submit experimental data through the course platform. To ensure the authenticity and validity of the experimental data and to prevent plagiarism, the submission of experimental data can include multiple dimensions, such as adding on-site photos, videos, and interaction records with the experimental teachers, etc. Classroom performance data is mainly extracted automatically from classroom videos to determine the students' activity level and concentration, and give appropriate scores. Quizzes can have both offline and online forms. The online form data directly enters the data analysis platform, while the offline form can generate scores after electronic marking and then enter the analysis platform. Mid-term tests are important interim data, which are important indicators for credibility analysis in the analysis platform and also highly weighted evaluation data. It is recommended to collect data through offline exams and electronic marking. The final data is the final exam, which is the most important data among all and an important reference for evaluating validity and reliability. The weight is also the largest. Generally, an offline closed-book exam is adopted, and paper test papers can now be electronically entered and then judged online, which can maximize fairness and justice.

4.2 Evaluation Entry

The evaluation entry is mainly connected with the teaching teachers. The data collected through this entry will be processed by the data mining platform for classification, comparison, and decision-making, and then provide constructive conclusions or suggestions. The teacher must first analyze the reliability of all the data, that is, the credibility of each student's data and the credibility of data for each class and grade. This can be done through horizontal data comparison (between different students, between classes, between majors, etc.) and vertical data comparison (historical data of individual students, annual class data, grade data, and annual data distribution of different majors, etc.), considering the consistency of the results obtained when the same method is repeatedly measured on different objects, the reliability of the measurement data; The second point that the teacher needs to analyze is the validity of the data, that is, the effectiveness of the data. Only data that conforms to the laws has good validity. This includes ordinary cognitive laws, learning laws of this course, specific learning laws of each student, statistical laws of grades and classes, etc.; The third task that the teacher needs to complete is to conduct correlation analysis based on the data provided by the mining platform, to identify the key factors affecting classroom effectiveness and student learning effectiveness, thereby determining more realistic evaluation weights, and making the evaluation platform achieve dynamic balance.

4.3 Data Mining Platform

The data mining platform serves as a bridge connecting teachers and students. By classifying, mining, and comparing the collected data, it provides conclusions or suggestions to achieve the goal of improving the entire teaching process. The system flow is shown in Figure 2.
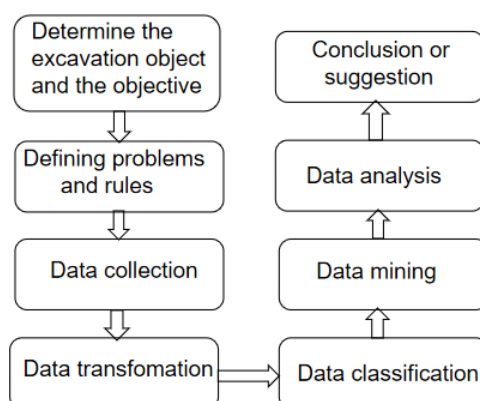

Fig.2 Data mining system flowchart

The first step in the data mining platform involves determining the execution goals, such as evaluating the teaching effectiveness of courses (for teachers), the learning effectiveness (for students), and the validity of course content, etc., to set the final goal and the endpoint for optimizing constraints of the entire data mining system; the second step is to determine the principles of improvement, the definitions of validity and reliability, etc., through interaction with historical data, to determine the influencing factors of validity and reliability as well as the weights of each data; the third step is to sort out the data collected from the data entry, removing the noise and invalid data from the data; the fourth step is to perform data transformation, converting the data into a format that the platform can handle; the fifth step is to perform data classification, categorizing the data according to different sub-goals, and entering the corresponding database, waiting for the next processing; the sixth step is the data mining work, conducting mining, classification, analogical retrieval, etc., based on the validity and reliability of the data; the seventh step is to analyze the data, using decision tree technology to semantically process the data, combining the goals to determine the convergence conditions, and the final step is to provide conclusions or suggestions based on the converged data. The entire system is dynamic and can optimize its own parameters and rules while processing data from different periods.

V.   CONCLUSION

The data mining platform has improved the efficiency of the original evaluation system. In the traditional course evaluation system, there are a large amount of repetitive and inefficient data entry and organization tasks in teachers' work. Moreover, the composition and source of these data are relatively simple, mainly based on test scores. Based on such data, the evaluation of students' learning outcomes is one-sided and insufficient. However, due to students' sensitivity to GPA and grades nowadays, teachers find it difficult to break away from the existing evaluation methods and systems, and can only remain stuck in the status quo,

seeking no mistakes. This state seriously affects the enthusiasm of teaching and the intrinsic motivation of students' learning, and is of no help to the construction and improvement of the course evaluation system. The new evaluation system improves this problem from the aspects of the richness of data and the significant improvement in the efficiency of data entry. Firstly, the establishment of data can use the existing historical data as the basic reference for evaluation. Secondly, according to the different modules of the evaluation system, it can efficiently process multi-dimensional learning effect analysis data, such as learning effect data, learning attitude data, and learning foundation data, achieving efficient multi-dimensional data entry and processing.

The data mining platform eliminates the lag of the traditional evaluation system. Traditional course evaluations are usually conducted after the course ends. For the learning subjects, at this time, the evaluation has no impact on students' learning outcomes anymore. Therefore, the evaluation for students has little benefit because the evaluation is completed when students can no longer make any efforts or improvements. However, this project's evaluation system aims to solve this problem. The evaluation process is a dynamic one, that is, through the joint participation of teachers and students, feedback is provided in real time based on the results of multi-dimensional data analysis during the teaching process, and specific reasonable suggestions are proposed for each student to improve in learning, and learn in the process of improvement, achieving mutual growth and common progress.

The data mining platform enhances the objectivity of the original evaluation system. In the previous evaluation system, there was a problem of the excessive proportion of test scores in the evaluation system. Introducing other evaluation methods, due to concerns and worries about human influence, made teachers feel hesitant to act. However, the new evaluation system aims to achieve the unity of evaluation objectivity and richness. Through rich evaluation dimensions and data entry, through artificial intelligence data analysis, objective evaluation results are obtained, minimizing the influence of human factors as much as possible, while meeting students' requirements for the objectivity of the evaluation system, providing specific reasonable suggestions for students' learning, ensuring the comprehensiveness, timeliness, and effectiveness of the evaluation, and completely stimulating students' intrinsic motivation, achieving significant progress and development in both teaching and learning.

VI.   ACKNOWLEDGEMENT

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