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Construction and Improvement of a Vocational Education and Teaching System Oriented to "Internet+"

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ABSTRACT

Given the current rapid development of informatization, people will increasingly use online teaching methods to learn for their quality improvement. Starting from the fundamental theories, such as the concept, classification, basic process, task, and method of data mining under the background of Internet Plus, this article analyzes the problems that must be considered in data mining application. Secondly, the Apriori algorithm is studied, the FP-Tree flow chart is established, and the Internet Plus vocational education teaching system model is constructed using multiple databases as data sources. Finally, the results of the teaching system are analyzed and verified, with the model analysis showing that the minimum confidence boost of the system is 0.65, and the minimum support reaches 0.03. The maintainability of the database based on the association rules Apriori algorithm is good; the data entry can be completed smoothly, and the update, deletion, and modification can also be completed smoothly.

KEYWORDS

Internet +, Internet Plus, vocational education,teaching system

INTRODUCTION

With the continuous development of the knowledge economy, the demand for education in society is also increasing. More and more countries realize that in order to improve national competitiveness, education must be developed first (Zhuang & Zhu, 2023). For a long time, traditional vocational and technical colleges have been influenced by factors such as educational positioning, educational model, faculty strength, and student abilities (Atteh et al., 2023). They have not fundamentally broken away from the subject-based teaching model. In teaching implementation, teachers play a leading role as knowledge transmitters, and they usually adopt a preaching style of teaching (Liu, 2023). This teaching mode allows teachers to organize teaching content and implement teaching practices, monitor the teaching process, play the leading role of teachers, and impart systematic scientific knowledge (Pan et al., 2023). However, it can easily lead to a disconnect between theory and practice and a single teaching method and examination form. This teaching model is more suitable for cultivating knowledge-based or technical talents than innovative or skilled ones (Li, 2023).

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This paper aims to introduce the Internet Plus technology into constructing the vocational education teaching system, intending to optimize the practical teaching system in vocational colleges further and improve the teaching quality. Based on the analysis of the deficiency of the current network learning system and the research status of collaborative learning mode at home and abroad, facing the background of internet plus, this paper first introduces the fundamental theories of data mining in Internet Plus, such as concept, classification, primary process, tasks and methods. It analyzes the problems to be considered in the application of data mining. This part is the theoretical basis of our research on vocational schools' network teaching management systems.

Secondly, the Apriori algorithm is studied, and the FP-Tree flow chart is established. Using multiple databases as data sources, valuable information such as learners' access behavior rules, errors, and problems in the learning process can be found in the accumulated log information. Then, the Internet Plus vocational education teaching system model is constructed. Finally, the results of this teaching system are analyzed and verified, and good results and performance are obtained. To provide reference significance for optimizing and promoting the overall level of practical teaching in vocational schools.

This paper is focused on Internet Plus and studies the construction and improvement of vocational education teaching system. Its innovations are as follows:

(1) It realizes the organic combination of teaching management standardization and the education and teaching innovation; all the key links that form the teaching quality are under control. The teaching and training process management should be standardized and flexible rather than too rigid.
(2) Ensure that the basic model and ideas of the established teaching quality assurance system continue to be effective. According to this, vocational colleges' standardized quality assurance system can constantly monitor, analyze, and improve itself in the application process and solve problems in time. It can also adjust schools' education and teaching work according to social needs, standardizing and improving so that established teaching quality assurance systems can continue to be effective.

LITERATURE REVIEW

The development of computer technology provides opportunities for optimizing educational resources, making it possible to deliver rich teaching resources to individuals located at a certain distance or educational groups scattered in different regions (Li, 2023). Online education has special significance in achieving personalization as teaching according to individual needs has always been tha principal goal pursued by the teaching service system. However, due to education system constraints and a lack of educational resources, there was still a long way to go towards this goal (Zhou, 2023a). Today, students have largely overcome the limitations of time and space through online learning.

In online learning, students can choose corresponding majors based on their education level and learning interests, achieve a people-oriented and self-centered learning network, and adjust their learning content and progress according to their learning conditions. Most advanced vocational school's online teaching management system websites have accumulated rich learning materials, learner user information, learning progress, and operational record logs (Dai & Nie, 2023). However, problems will arise if this information cannot be effectively used (Zhao, 2023a), and it can then represent a significant waste of resources in the collation and storage of data. The disadvantage of online teaching is passive execution, which fails to adjust based on students' interests and knowledge abilities. While online teaching resources enrich teaching content and methods, the existing teaching methods and methods are relatively traditional and not flexible enough, making it difficult for learners to learn as needed. The current e-learning system mainly supports self-directed learning, lacking an environment for solving poorly structured and complex problems (Wang & Chen, 2023).

Exploring the challenges and potential solutions in enhancing higher vocational education quality, particularly from a data-driven edge computing and modern quality management perspective, is the focal point of recent scholarly discourse. While extensive research has been conducted on the advantages of data-driven edge computing in the Internet of Vehicles, its development still faces some challenges, among which many issues are worthy of study (Zhou, 2023b). At present, a problem that people are very concerned about in the reform and development of higher vocational education is the development of the quantity and the improvement of the quality of higher vocational education (She, 2023). People's worries about higher vocational education quality are becoming increasingly intense. To study higher vocational education from the perspective of modern quality management The theory and application of teaching quality management is the frontier field of research on the quality of higher vocational education .Ma (2023b) believed that higher education quality is a multi-faceted concept. Deng investigated the quality of higher vocational education and showed how education evaluation is a vital link to adapt the education system to the development of society, economy, science and technology, and cultural and sports undertakings (Deng, 2023). It is an important measure to deepen education reform and improve education quality. The primary means of management. Meiyan (2023, 23) proposed that "educational quality is manifested not only in the final result of education, that is, the quality of students, but also in all aspects and links of the complete educational process." Only these factors have their quality and are reasonably configured with each other. Overall higher education quality can be achieved with effective configurations (Yan, 2023). All colleges and universities must strengthen the educational process and results monitoring and further improve the school's internal education quality monitoring system. The quality of higher vocational education is the quality of higher vocational education services, which depends on the comparison between the expectations of the subject of education demand on the quality of higher vocational education services and the actual perceived educational service level (Sun, 2023).

Collaborative teaching became popular in British and American schools in the middle of the 20th century. The collaborative teaching method is to organize students or learners into several groups, and multiple students or learners in each group cooperate and cooperate with each other to solve corresponding learning problems. Luo believes that computer-supported collaborative learning is the product of the combination of computer-supported collaborative work and collaborative learning theories and methods (Luo, 2023). The teaching management system should be guided by advanced educational ideas and network computing teaching concepts, supported by computer and network technology, modern educational technology, and information technology, and constructed based on openness, interaction, and sharing (Chen, 2023). This data-sharing method can avoid repeated operations in management activities. Good data sharing can improve the efficiency of teaching management and student achievement. Students are not limited by geographical and time constraints when they engage in cooperative learning activities such as peer teaching, group discussions, group exercises, and group remarks (Zhao, 2023b). Combining the knowledge students acquire closely makes it possible for people at different ages, times, and places to learn collaboratively (Zhao, 2023b).

Vocational teaching quality management has become an important research topic in vocational education. However, most studies focused on discussing how higher education as a whole can learn from modern quality management. In comparison, few studies are specific to higher education, especially on establishing a vocational teaching system in higher vocational education (Fan et al., 2024). Therefore, establishing a scientific vocational education teaching system will have specific theoretical and practical significance for Internet Plus. Based on systematically absorbing the previous theoretical achievements, this paper is committed to studying the formation mechanisms of various factors of the vocational education teaching system on the teaching quality, establishing the vocational teaching system, constructing the education teaching quality management system, and providing general theoretical guidance and practical operation tools for the vocational education management practice (Zhang, 2023a).

METHODOLOGY

Overview of Relevant Technologies

In the Internet context, the database's scale continues to expand, and the amount of data also increases (Zhang, 2023b). Managers can make correct decisions from the overall point of view, and databases already exist in many industries (Ma, 2023a). However, when the data is too large, decision-makers may not find the necessary information to play a supporting role (Hu & Wang, 2020). Therefore, when they want to find particular information, they can no longer obtain satisfactory results only by relying on traditional means such as reports and queries.

When screening and processing vast volumes of data, a new data mining approach is needed to discover hidden helpful information. After the emergence and development of data warehouse technology, data mining technology has become increasingly mature and widely used. Data mining is the most cutting-edge discipline that spans a variety of technologies, from simple data query to data analysis and statistical application, from which useful information can be extracted to help planners change market strategies, reduce losses, and make wise judgments (Wei et al., 2023). Usually called knowledge discovery in a database (KDD), it appeared in the late 1980s and was further developed in the 1990s. Its application fields are extensive, mainly used in fields such as education and teaching, finance, and data mining classification. It is necessary to classify different types of data mining systems as the emergence of data mining is a product of multiple disciplinary systems, mainly including database systems, machine learning, information science, computer science, and other disciplines. The data mining generally consists of problem definition, data preprocessing, modeling, evaluation, and deployment (Figure 1).

A high frequency means the occurrence group must reach a certain level for all recorded frequency items. The threshold condition under the minimum confidence level is set to generate rules using the high-frequency k-items in the previous step. If the reliability of the rules meets the minimum confidence level, they are declared association rules. This algorithm finds association rules with greater than minimum support and minimum confidence. The dataset has some regularity between attribute values forming association rules. Two parameters of association rules (i.e., support and reliability) are used to measure the correlations. The data mining method is shown in Table 1.

Set the frequency set found in the first step to generate ideal rules, and the result can only contain a set of all rule items, each with only one rule right part. Once a defined rule is generated, users with minimum confidence greater than the specified unique rule will be rejected. The conditional FP tree structure is a sub-database prefix and suffix tree path composed of FP pattern by the length of the first suffix pattern. The recursive tree is mined from the initial conditions of FP suffix pattern tree structure. The generation of the initial suffix pattern suffix tree and conditional FP tree realize the connection. When the original data is divided, many original data can be combined to place the FP-tree in the main memory. The primary disadvantage of the approach is that there are too many combinations of candidate item sets and unnecessary parameter combinations must be removed. The support calculation includes a scan of all the data. Assuming that it is a huge database, the Apriori algorithm will increase the computer system's load in an equal proportion series. We can establish the FP-Tree flow chart, as shown in Figure 2.

Using data mining technology to analyze and process this massive data has real value. Through repeated interactions between learners and the teaching system, the system can finally provide personalized recommendations and guidance according to the characteristics of different users. The application strategy of web mining can apply methods in many related fields (such as pattern recognition, statistics, and data mining), automatically collect and store data according to the required conditions, and manage these data. The design of the system is a Web-based web design BS pattern. Permission settings are set for different users, and corresponding operations can be performed at different levels to ensure the system's security. With the development of computer technology, the problem is not knowing information but whether to grasp the information hidden behind the apparent

Figure 1. The process of data mining

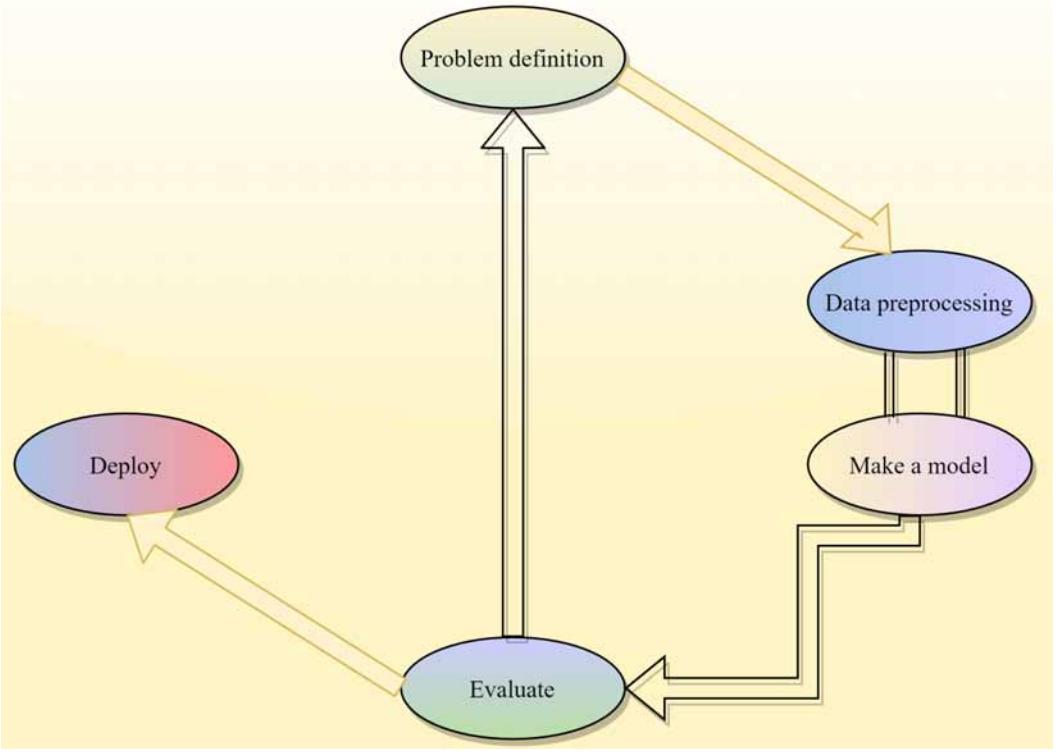
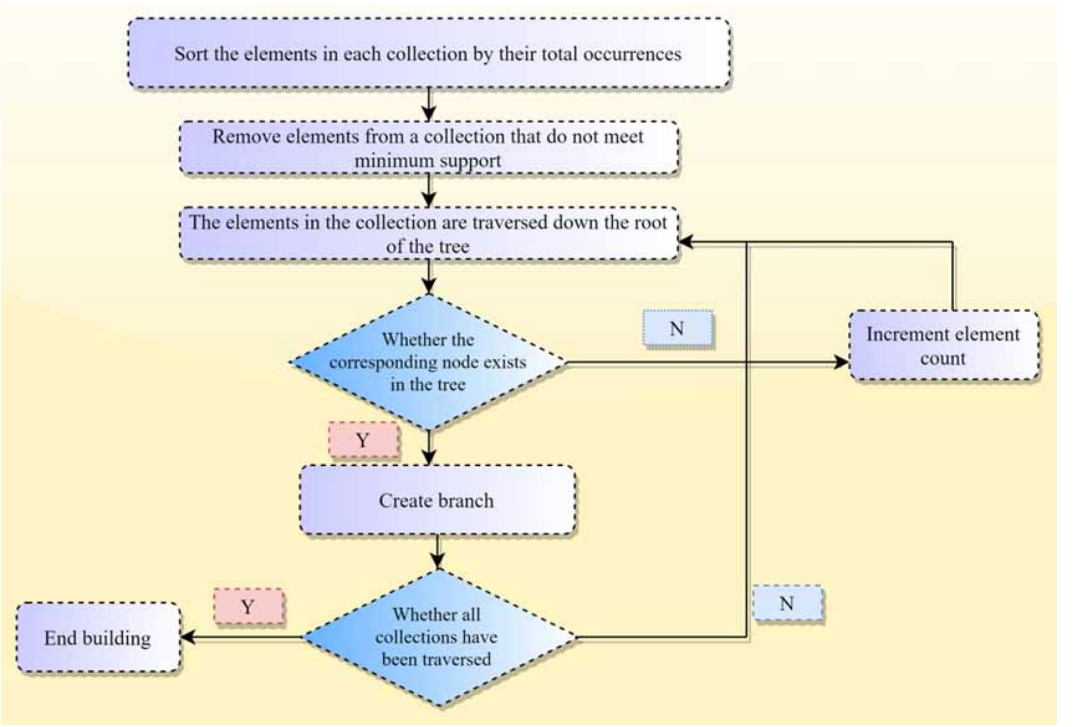


Table 1. Data mining methods

Method	Content	
Categorical Predictive Methods	Decision tree method	
	Neural network approach	
	Rule induction	
	Support Vector Machines	
	Bayesian method	
	Rough set method	
	Regression analysis	
	K-nearest neighbor method	
	Combined learning method	
Descriptive method	Clustering	
	Correlation Analysis	
Text/Web Mining Methods	Web mining	Content Mining
		Structure Mining
		Usage mining

information. Web data mining provides an effective solution to this problem. Data mining extracts interesting and useful patterns from web-related resources and behaviors. Web analytics then provides

Figure 2. Flow chart of establishing FP-Tree



in-depth, accurate, and detailed analysis data, transforming it into valuable and comprehensible information for website operations.

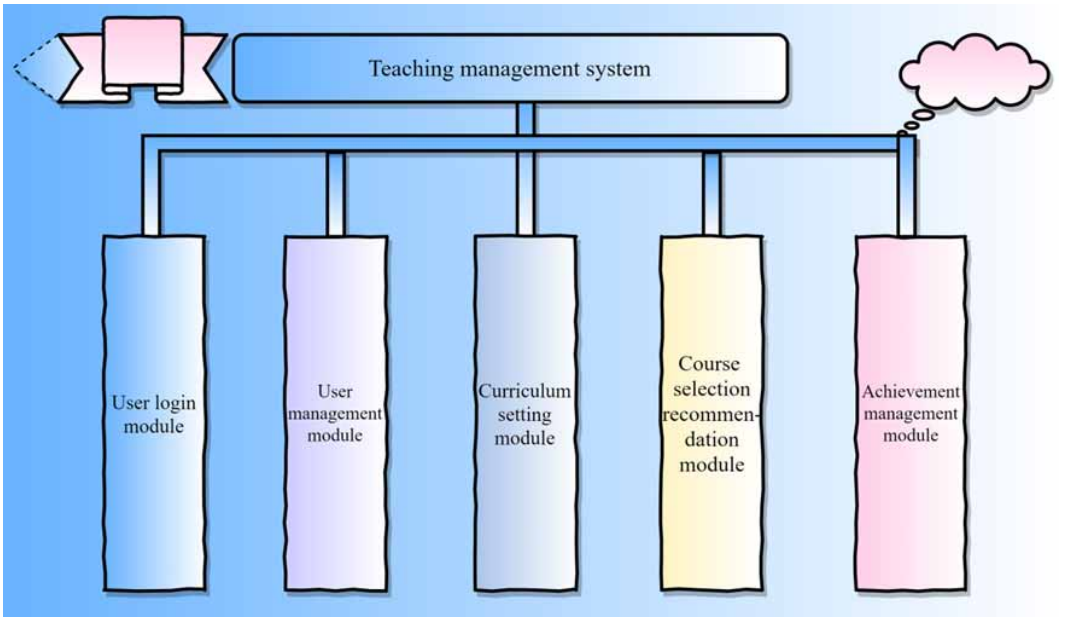
Creating the Internet Plus-oriented vocational school network teaching system relies on the web mining process. Data preprocessing, pattern discovery, pattern analysis, and application are the main steps. Such a process is complex but depends on learners' information feedback, continuous analysis, and induction in mining and analyzing the data.

The network structure design of the system comprises three types of computers: computing server, database and WEB server, and OLAP server. A large amount of data is stored in the calculation server. These data are the current and previous operating data of the system. The primary function is to calculate data, support the generation of new data daily, or analyze the old data. Database servers, web servers, and OLAP servers, such as these, provide network resource information services. In particular, OLAP servers offer robust support for fast and complex data queries through online operations.

Construction of Vocational Education Teaching System Model Based on Internet +

Taking multiple databases as data sources, the core database is the network management teaching management system and other business systems. There are additional external databases related to business, such as the teacher information database, student information database, course information database, and student achievement database. These databases are built into unified business data that can be managed, and a teaching management decision-making system based on big data is designed and implemented. The network teaching management platform can provide functional services of information query, report management, and data analysis for personnel at each level, use or design and develop tools that can complete specific service functions, and provide information decision support for users at each level, leaders and managers of various colleges and departments. The network teaching management system is shown in Figure 3.

Figure 3. The network teaching management system



The amount of data in information resources constantly increases, creating a vast dataset. Business expansion performance and analysis function are indispensable factors. Therefore, the logic of the database should be designed to be relatively independent and redundant to provide an extended interface for future big data storage.

Firstly, the data is preprocessed, which includes two steps: fusion and cleaning. Fusion is to merge 30 sub-files into a log file, which can facilitate the subsequent data processing. That is, to clean up the data that interferes with or is not needed in the data processing process. The logs cleaned in this paper mainly include the following points: first, the access logs of other sites; second, the access logs of crawlers; and third, the wrong access logs. The three kinds of cleaning are relatively simple. Fourth, logs of non-get requests; fifth, logs of non-HTML types of requested resources. Back-end storage device group comprises many cheap computers with different performances and a large-capacity server. This system connects all storage nodes into a ring through the proposed improved data layout algorithm to form a sizeable virtual storage pool, providing unified storage services to the outside world. The implementation process of the layout algorithm is as follows:

Allocate weight values to all backend storage nodes, sort their weight values from small to large, given a threshold f, and calculate the difference d_i from the second weight value and the first weight value, respectively:

$$d_i = \left| \varpi_{1+i} - \varpi_1 \right| \tag{1}$$

If $d_i \le f$, the corresponding storage node belongs to the current node set BD_j, traverse all nodes in turn until the first weight greater than the threshold appears; the current weight value is re-used as the first weight value, and the next one is the second one Weight value, renumber the remaining weight values in turn, and then repeat the second step until all weight values are traversed.

Assuming that the merged large set is $\left\{BD_1, BD_2, ...BD_k\right\}$, the actual number of nodes in each node set is denoted as n_i; calculate the average weight $\varpi \in \left\{\varpi_1, \varpi_2, ..., \varpi_k\right\}$ of each merged set, where:

$$\varpi_i = \frac{\sum_{j=1}^{n_i} \omega_j}{n_i} \tag{2}$$

According to this average weight, a virtual set BD_i is allocated to each node set, and its number is:

$$N_i = \left[\frac{\varpi_i}{\varpi_k} k \log n\right] \tag{3}$$

When adding a device, calculate the relative weight of the device:

$$W = v / \left(\sum_{i=0}^{n} v_i + v\right) \tag{4}$$

Find the corresponding set, add the new device to the set, and add the new device to the small ring formed by the set according to the classic consistent hashing algorithm. The data migration strategy adopts the classic, consistent hash algorithm strategy. In the case of large samples, according to the law of large numbers, when the sample mean distribution tends to be normally distributed, the maximum likelihood estimate of the overall feature quantity is:

$$\sum = \frac{1}{n} \sum_{i,j}^{k} \left(X_i^j - \bar{x}\right)^i \left(X_j - \bar{x}\right) \tag{5}$$

If the sample values are normalized, the reference space G is a hyperellipsoid with a mean value of 0. In addition, the Mahalanobis distance from the test sample to the reference space is:

$$MD_i = \left(Y_i - \mu\right) \sum^{-1} \left(Y_i - \mu\right) \tag{6}$$

Standardize it to obtain the scaled Mahalanobis distance from the sample to the reference space as:

$$MD_i = \frac{1}{k} Z_i R^{-1} Z_i^r \tag{7}$$

Benchmark space optimization selects the feature variables with a larger recognition contribution from the original feature variables. In the effective feature extraction of, the signal-to-noise ratio is used as a feature extractor to select an appropriate two-level orthogonal table. For each row of the orthogonal table, use the sample data of ω_1 to generate a reference space but only use the data for

dimensionality reduction; that is, the feature whose level is "1" in each row participates in generating the reference space. Then, find the signal-to-noise ratio of this distance:

$$\eta_i = -101g\frac{1}{N_2}\left(\sum_{j=1}^{N_2}\frac{1}{MD_{ij}}\right) \tag{8}$$

RESULTS AND ANALYSIS

Analysis of Experimental Results

The pseudo-code process of the Apriori algorithm is implemented, and the algorithm can be divided into two processes. First, when generating frequent itemsets, the minimum support of the algorithm needs to be set. This paper gives the statistics of K-frequent itemsets when the minimum support is 0.001, as shown in Table 2 below.

The total number of sessions that have been obtained in the data preprocessing work is 53912. According to this total number, the maximum support degree of each frequent itemset is obtained. The maximum support is 0.29, 0.097, 0.026, and 0.003, respectively. The above data shows that the frequent itemsets of this dataset have very little support, so further processing is needed. Taking the minimum support as 0.001, calculate the frequent itemsets of the new data set; the abscissa is the frequency K, and the ordinate is the number of the frequent itemsets, as shown in Figure 4.

After obtaining frequent data sets, the second process is to generate rules with the help of frequent item sets. The code for generating rules is still as given in section 5.2.2. Then, some association rules are generated. During the generation process, the minimum confidence is 0.5, and the minimum support is 0.01, as illustrated in Figure 5.

When generating rules, the minimum confidence in the brackets in the figure above is used as a threshold parameter, that is, the minimum confidence of the generated rules. If the confidence of the generated rules is less than this value, the rules will be excluded directly. In addition, the rule's confidence is affected by the antecedents, so it must be considered in both the antecedents and the confidence; that is, when the support and confidence are both high, the generated rule is desirable. The selection of minimum confidence directly affects the number of rules generated. In other words, if the number of item sets is certain, the higher the minimum confidence is, the fewer rules will be generated. Association rules can be inferred as follows. According to the statistical data, if a customer has visited web pages 4 and 6, the probability of continuing to visit pages 5 and 9 is greater than 90%, and the probability of visiting pages 1 or 7 is also very high. Therefore, on page 6, we recommend pages 5, 9, 7, and 1 to customers, and the order of recommendation is arranged according to the probability. Assuming that the customer visits page 7 in the next step, the probability of visiting page 5 in the next step is greater than 90%, so continue to recommend page 7 to the customer If the customer visited

Table 2. K-frequent itemsets statistics when the support is set to 0.001

k	Quantity	Maximum number of occurrences
1	506	15669
2	122	5245
3	46	1389
4	4	167
>4	0	0

Figure 4. The number of partial frequent itemsets after removing partial sessions

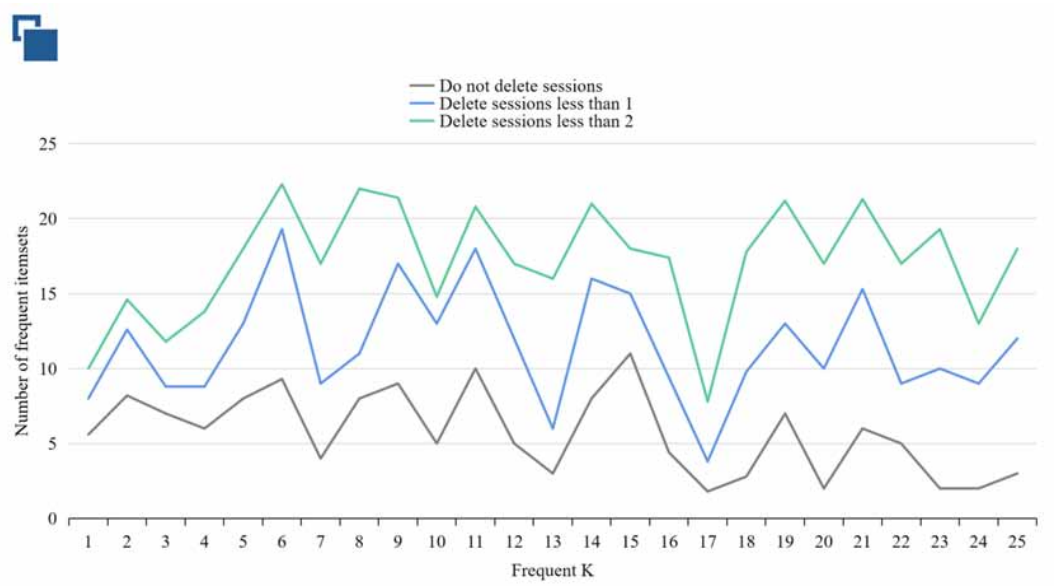
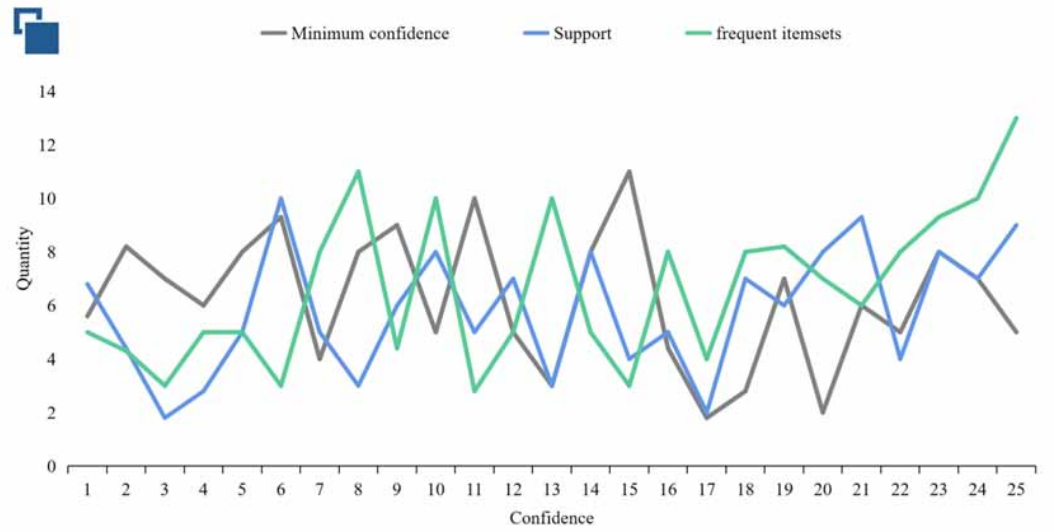
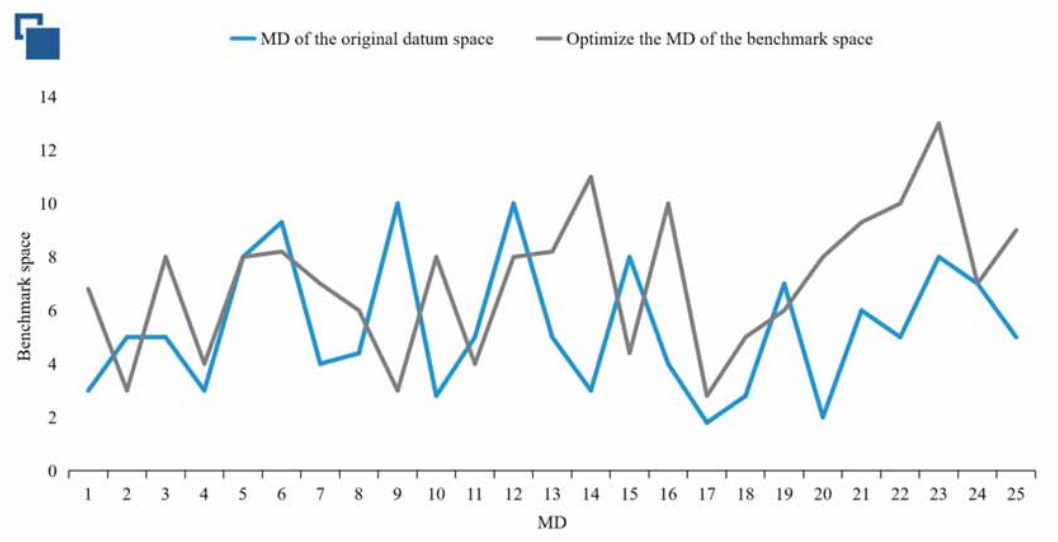


Figure 5. Corresponding relationship between confidence and number of rules



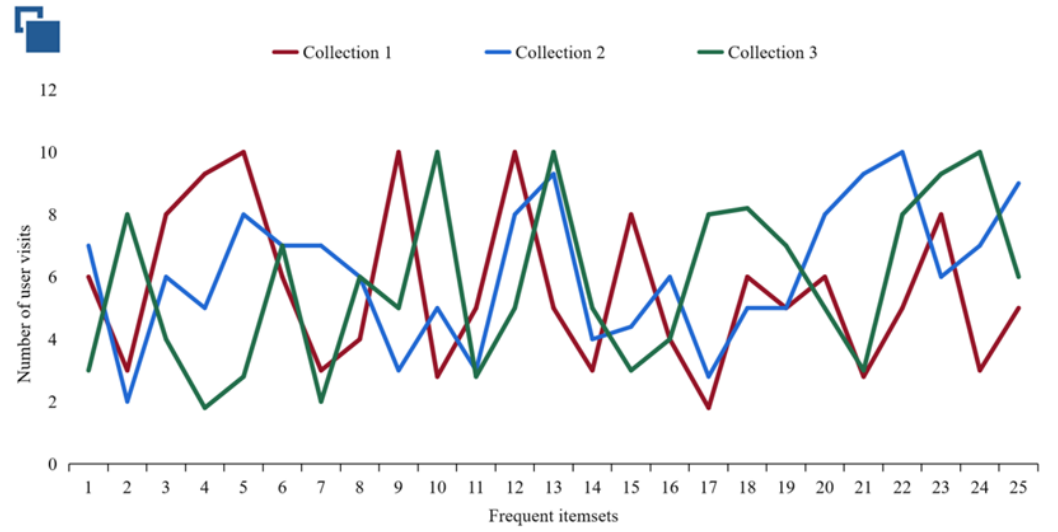
page 9 in the previous step, the probability of visiting pages 5, 12 and 25 is very high. At the same time, note that the probability of accessing page 5 is 100%, which may be that there is only one single link to 5 on this page or the page that must be visited is 5. Moreover, the probability of visiting pages 12 and 25 after visiting 4, 6, and 9 is also very high. Using this probability logic reasoning, we can recommend that everyone pays attention to the visited customers on the next page. We suggest that customers are guided to continue browsing for more information, provide convenience for customers, and improve the system's reputation. According to the number of frequently accessed users, the MD comparison of training sets is shown in Figure 6.

Figure 6. MD comparison chart of the training set



When users visit the distance education system in the future, the system can actively provide reminders to customers to guide them directly to places of interest, improving efficiency and customer recognition. For example, many current websites can record the content customers browsed last time. After logging in again, users can query the content they visited last time, directly enter the desired content area, or continue browsing the content of the previous time, which is extremely convenient. For the Apriori association rules algorithm, the first step is to process the filtered data to generate frequent item sets and then use the frequent data sets to generate rules. The relationship between frequent item sets and user access quantity is shown in Figure 7.

Figure 7. The relationship between frequent item sets and user access visits



It is possible to further improve the site structure according to the frequent project set and current structure. From the perspective of support, the greater the support, the more times users access the page, and the larger the number of users. Therefore, the content on these pages may be information of interest to customers. Therefore, it must be placed it in a conspicuous or accessible place, such as setting a connection directly on the home page. The model's analysis results shows that the system's minimum confidence is improved to 0.65, and the minimum support is 0.03. Based on the Apriori algorithm of association rules, the database has good maintainability, the data entry can be completed smoothly, and the update, deletion, and modification can also be completed smoothly.

Analysis of the Application of Improving Vocational Education

In today's rapidly changing social and economic environment, the importance of vocational education is becoming increasingly prominent. With the rapid development of information technology, especially the application of "Internet plus" technology and data mining technology, vocational education also faces enormous opportunities and challenges. How to fully utilize these new technologies and insights to improve vocational education and enhance teaching quality and effectiveness has become an urgent problem to be solved. "Internet plus" technology and data mining technology have brought unprecedented opportunities for vocational education. Students can flexibly and independently acquire knowledge and skills through online learning platforms, electronic textbooks, virtual laboratories, and other tools. Through big data analysis and mining, educational institutions can better understand students' learning needs and behavioral patterns, and optimize teaching processes and resource allocation. However, further research and exploration are still needed to apply these technologies and insights to vocational education and achieve substantial improvements and enhancements. Here, we provide several clear and feasible suggestions for reforming and developing vocational education, hoping to promote innovation and optimization of educational models to better adapt to social needs and student development requirements.

(1) Personalized learning platform: develop a personalized learning platform using "Internet plus" technology and data mining technology, and tailor learning content and methods for students according to their learning characteristics. This can increase students' interest and participation in learning, and enable them to more effectively master the knowledge and skills they have learned.
(2) Teaching process optimization: Using data mining techniques to analyze student learning data, and understand the difficulties and problems students encounter by in the learning process to adjust teaching progress and methods accordingly. At the same time, the Internet Plus technology can also be used to expand the teaching space and time and enhance the teaching effect through online teaching and interactive communication.
(3) Industry adaptability training: use the "Internet plus" technology and data mining technology to analyze the recruitment needs and talent training requirements of different industries and enterprises and provide corresponding teaching resources and training programs for vocational education institutions. This can improve the adaptability and practicality of vocational education, providing students with better employment security and career development opportunities.
(4) Teacher training and management: use the "Internet plus" technology and data mining technology to provide teachers with continuous vocational training and learning opportunities and constantly improve their teaching level and teaching philosophy. At the same time, online teaching and teaching management systems can also be used to strengthen the assessment and evaluation of teachers and provide better teaching support and management services for teachers.
(5) Sharing and integration of educational resources: the Internet plus technology and data mining technology are used to establish a sharing platform for vocational education resources and an open curriculum system and to share high-quality educational resources and teaching experience with more educational institutions and students. This can improve the efficiency and accessibility of educational resource utilization and promote the common development of vocational education.

To sum up, using "Internet plus" technology or data mining insights to improve vocational education requires in-depth research and exploration from personalized learning, teaching process optimization, industry adaptability training, teacher training and management, and education resource sharing and integration to provide more feasible suggestions for the reform and development of vocational education.

However, in practical application, using Internet plus technology and data mining insights to improve vocational education also faces some challenges. Here are some common challenges and countermeasures:

(1) Insufficient technological infrastructure: In some regions, vocational education institutions may face issues such as insufficient network bandwidth and outdated equipment, which may hinder the smooth implementation of online teaching and data mining work. Therefore, educational institutions can increase investment, update infrastructure, improve network speed and stability, and ensure the reliability of technical support.
(2) Teacher education and training needs: Teachers may lack understanding of the application of new technologies and data mining techniques, and it is necessary to strengthen their training and professional development. Schools can consider conducting relevant training courses, providing teacher education resources and guidance, and encouraging teachers to participate in self-directed learning and communication.
(3) Data protection and privacy issues: In data mining, students' personal information and learning data must be strictly protected to prevent data leakage and abuse. Educational institutions should establish sound data protection mechanisms and standards, clarify the scope and authority of data use, and strengthen information security technology and management.
(4) Learning motivation and participation: The establishment of online learning platforms needs to consider students' learning motivation and participation to avoid situations where students lack autonomy and enthusiasm. Therefore, educational institutions can consider designing personalized learning programs, providing diverse learning resources and activities, and strengthening student interaction and feedback.
(5) The evaluation and recognition of teaching quality: How to evaluate the effectiveness and quality of online teaching and data mining in vocational education and gain social recognition has become a challenge. Educational institutions should establish effective evaluation systems and standards, draw on the experience of industry certification and rating agencies, and increase the transparency and credibility of teaching quality.

In a word, facing the challenge of applying Internet Plus technology and data mining to vocational education, all parties must work together, including governments, educational institutions, teachers, students, and technology enterprises. Increase investment, improve infrastructure, enhance teacher training level, strengthen data protection and privacy protection, design effective learning plans, establish evaluation systems, and jointly promote the development and innovation of vocational education.

CONCLUSION

Facing the Internet Plus, it is the general trend to build a vocational network teaching management system and its application, which has a very broad prospect. As an auxiliary way of traditional teaching, network teaching has played many advantages in the education field. It has become a popular educational model increasingly accepted by the public. This paper mainly discusses constructing and improving the Internet Plus-oriented vocational education teaching system from the following aspects. Firstly, this paper introduces the concept, classification, primary process, task, and method of data mining in the context of Internet Plus, and analyzes the problems that need to be considered

in the application of data mining. This part is the theoretical basis of our research on the vocational school network teaching management system. Secondly, the Apriori algorithm is studied, and the FP Tree flow chart is established. Using multiple databases as data sources, valuable information such as learners' access behavior rules, errors, and problems in the learning process can be found from the accumulated large amount of log information. The "Internet +" vocational education teaching system model is constructed. Finally, the results of the teaching system are analyzed and verified, and good results and performance are obtained. The analysis results of the model show that the minimum confidence of the system is improved to 0.65 and the minimum support is 0.03. Based on the Apriori algorithm of association rules, the database has good maintainability, the data entry can be completed smoothly, and the update, deletion, and modification can also be completed smoothly. This paper only focuses on the Internet Plus teaching mode in vocational education and does not involve its application in other education fields or industries. In the future, we can consider in-depth research on applying the Internet Plus teaching mode in different education fields and industries and explore its potential and limitations in higher education, basic education, vocational education, enterprise training, and other fields. In addition, although the data mining methods and algorithms mentioned in this article can improve teaching effectiveness to a certain extent, they cannot completely replace traditional teaching methods, and their application scope and limitations need further research and exploration. Future research should consider integrating educational technology and artificial intelligence, such as natural language processing and machine learning technologies to develop intelligent assisted teaching systems and personalized learning platforms, providing students with more personalized and adaptive learning experiences and support.

AUTHOR NOTE

The figures and tables used to support the findings of this study are included in the article. The authors declare that they have no conflicts of interest. This work was supported by the Key Item of Educational Science Planning Project of Henan Province in 2019: the Analysis of the Realistic Predicaments and Paths of the Cooperative Innovation of Colleges and Universities in Henan Province ([2019]-JKGHZD-15); Higher Education Teaching Reform Research and Practice Project of Henan Province in 2021: The Difficulties and Breakthroughs of Teaching Quality Supervision in Universities under the Credit System (2021SJGLX492); and The Key Item of Teacher Education Curriculum Reform Research Project of Henan Province in 2023: Research on the Reshaping and Practice of Talent Cultivation Mode of Teachers College from the Perspective of Integration of Vocational Education and General Education, Industry and Education, Technology and Education (2023-JSJYZD-050). The authors sincerely thank those whose techniques have contributed to this research.

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