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Innovation of Computer-assisted Instruction Mode of News Dissemination Course Based on Improved Collaborative Filtering Algorithm

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Abstract. Computer-assisted instruction (CAI) refers to the proper selection and full and reasonable use of computer media for teaching assistance under the normal teaching mode, so as to achieve good teaching results. With the increasing quantity of online users and courses, the course suggestion system exposes some problems such as diverse user characteristics, complex student interests and preferences, and changeable user behaviors, which reduces the accuracy of the suggestion algorithm. This article proposes a individualized model of news dissemination course resources based on improved collaborative filtering (CF) algorithm. This model transforms student's interest behavior into student's interest keyword score, and changes in student's interest into changes in student's interest keyword score, so as to establish and update the student's interest model. The improved CF recommendation model can recommend course resources for students in a individualized and customized way, and can effectively enhance students' learning interest. On the basis of improving the sparsity and timeliness of data, the improved algorithm can improve the accuracy of course suggestion and satisfy users.

Keywords: Collaborative Filtering; News Dissemination; Course Recommendation; Computer-Assisted Instruction
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1 INTRODUCTION

With the wide use of CAI technology in teaching, the traditional instructional methods have undergone tremendous reforms. Alghamdi et al. [1] designed and implemented a computer-aided intelligent examination system. The computer-aided intelligent examination system is an examination system that combines computer technology and intelligent algorithms. It can manage and evaluate exams through automation and intelligence, thereby improving exam efficiency and quality. The system needs to design and implement a complete exam process, including paper generation, exam execution, automatic grading, and result analysis. This needs to consider various

possible exam scenarios and needs. The system needs to automatically generate test papers that meet the requirements based on exam requirements and knowledge points. This requires the use of some intelligent algorithms, such as genetic algorithms, neural networks, etc. The system needs to provide an online exam environment that allows students to take exams online. This needs to consider issues such as network connectivity, exam time, and anti-cheating. The system needs to automatically rate students based on their answers. This requires the use of some natural and machine learning technologies, such as text classification, machine reading, etc. Overall, the system requires the comprehensive application of various computer science, artificial intelligence, and data science, which is a complex and challenging task. Facing the new requirements of social development for news dissemination talents, news dissemination departments should adapt to the growth of the times and adjust the curriculum structure to cultivate broader, integrated and compound news dissemination talents for the society. The Internet of Things technology provides real-time and efficient communication and feedback mechanisms for online teaching systems. Through the Internet of Things technology, students can learn English anytime and anywhere, no longer limited by time and location. In addition, IoT technology can also provide personalized learning experiences, automatically adjusting learning content and difficulty based on each student's learning situation and progress, making learning more efficient. Chen and Huang [2] have significantly improved students' English learning performance and their English application ability through this system. By utilizing IoT technology, the system can integrate various smart devices, such as smartphones, tablets, smartwatches, etc., through which students and teachers can learn and teach online. Through online video, voice or text interaction, students and teachers can have real-time communication, improving learning efficiency and effectiveness. The system can provide personalized teaching content and strategies based on students' learning situation and needs, such as customizing teaching content based on students' English proficiency, learning style, and interests. Through the Internet of Things technology, the system can track students' learning progress, such as the courses they have already studied, the length of learning, etc., providing teachers with feedback on their learning situation. Overall, the system aims to provide a flexible, personalized, and interactive learning environment, helping students better learn English, and also providing more effective teaching tools for teachers. It is an inevitable choice for news dissemination education to face modernization and cultivate high-quality talents to introduce multimedia technology into news dissemination classroom teaching as a modern instructional method. CAI has broken the traditional instructional thought, made the instructional stage more flexible, effective and attractive, and has become a major instructional method in universities. In the era of knowledge economy and information industrialization, education shoulders more new tasks, so CAI has developed rapidly and is used by more and more teachers as an important instructional method. CAI will focus on students' dominant position. Through collaborative learning, situational creation and other methods, students can actively explore and think, promote students' continuous growth of associative thinking, and always maintain students' dominant position in information processing.

Corpus management technology provides efficient methods for processing and analyzing English corpus in English teaching. By constructing an English corpus, students can gain a deeper understanding of the usage and rules of the English language. At the same time, corpus management technology can also provide students with real English language situations, allowing them to master the English language in practical applications and improve their English communication skills. Gong [3] utilizes computer-aided technology to provide diverse learning resources and environments, while combining corpus management technology to efficiently process and analyze English corpus. This provides more accurate and reliable support for students to learn English. Through this system, teachers can more effectively manage and teach English courses, and students can delve deeper into learning and understanding the English language. The system can use corpus analysis tools to analyze the frequency and importance of different words used in English courses, and integrate this information into an intelligent word frequency table. Teachers can use this table to better understand the key vocabulary in the course and develop more effective learning plans for students. The system can use corpus tools to conduct contextual

analysis of sentences and paragraphs in English courses. By analyzing context, the system can provide more accurate and detailed vocabulary explanations and grammar analysis, helping students better understand the English language. The system can develop more effective teaching strategies by analyzing students' learning data and feedback. For example, if students are found to have difficulties in reading comprehension, the system can recommend some reading training courses and learning resources. And intelligent English learning environment, helping teachers better teach English courses and students learn English language more effectively. The course of news dissemination is one of the main courses of radio and television journalism. Its fundamental purpose is to cultivate students' solid knowledge and skills in journalism theory. If we can make good use of multimedia technology and organically combine CAI with traditional teaching, we can give full play to the role of CAI. Individualized recommendation is a targeted service mode, which provides users with resources to meet their individualized needs based on their historical behaviors, habits, preferences, backgrounds and specific needs. The birth of course suggestion system can solve the problem of online course information explosion well. Developers should develop a highly reliable course suggestion algorithm, get the course information needed by users quickly and accurately, and give perfect recommendation results, which becomes the research focus. In this article, CAI model is applied to the innovation of journalism and communication courses in universities, and an individualized recommendation model of journalism and communication course resources based on improved CF algorithm is proposed. He et al. [4] can better understand users' interests, preferences, and behavioral habits by constructing a dynamic user profile tree, thereby achieving more accurate news recommendations. This will improve user satisfaction while also increasing media click through rates and communication effectiveness. The UP tree can record multiple interest points of users and form a tree structure. By analyzing the structure and node information of the tree, we can understand the personalized needs of users and recommend news content that better meets their personalized needs. The UP tree can be dynamically updated and adjusted to adapt to changes in user interests. This enables the news recommendation system to keep up with changes in user interests in a timely manner, improving the effectiveness and quality of recommendations. The research and application of UP trees will contribute to cross innovation in the communication and news industries. By introducing new technologies and methods, the deep integration and development of the two industries can be promoted.

Jing and Jiang [5] optimized the computer-aided English teaching system using VB software. It uses VB (Visual Basic) software to develop a computer-aided English teaching system, which integrates various functions and optimization measures to improve teaching quality and student learning effectiveness. By analyzing the learning progress, learning style, and grades of each student, the system can provide personalized teaching content and methods based on their characteristics. For example, for a student with a weaker grammar foundation, the system can recommend some grammar exercises and explanations; For a student with good listening skills, the system can recommend some listening and speaking exercises. Through real-time interactive functions, students can ask questions, discuss, and submit assignments online, while teachers can answer questions, evaluate assignments, and provide feedback online. This can improve students' learning engagement and effectiveness. The system can automatically evaluate students' homework and exam answers, providing timely and accurate feedback. Through natural language processing and machine learning technology, the system can simulate the role of a human teaching assistant, providing real-time Q&A, homework correction, learning suggestions, and other functions. The system can develop more effective teaching strategies by analyzing students' learning data and feedback. For example, adjusting teaching plans and content based on students' learning progress and grades. Through the above optimization measures, the computer-aided English teaching system developed using VB can better meet the needs of students, improve teaching quality, and promote the development of English teaching. Multimedia presents some complex and microscopic knowledge with its vivid pictures, intuitive and vivid images and flexible ways, making invisible and boring content visible, flexible and vivid, attracting students' attention and stimulating learners' interest in learning. The course of news dissemination is both theoretical

and practical, which requires students to closely combine theoretical knowledge with the practice of news business. Multimedia technology has risen rapidly and gradually entered the classroom. It introduces classroom teaching into a new realm with its illustrated pictures, excellent audio and video, and suitable for both movement and static, and is widely welcomed by teachers and students. The application and growth of network IT has brought great impact to the current society, and provided a foundation for the education system, instructional methods and reform. The course suggestion system realizes the recommendation function to meet the needs and interests of users by mining and analyzing the relevant information of users.

This article mainly aims at improving the CF course suggestion algorithm, such as the cold start of new users, sparse scoring data and complex and changeable user behavior, so as to provide high-quality course suggestion service for users who study journalism and communication courses:

⊖ This article proposes a individualized recommendation model of news dissemination course resources based on improved CF algorithm. This model transforms student's interest behavior into student's interest keyword score, and changes in student's interest into changes in student's interest keyword score, so as to establish and update the student's interest model.

⊜ A course suggestion algorithm that integrates user features and interest clustering was studied to address the problem of traditional CF algorithms neglecting user features and difficult to obtain student interest preferences. During the improvement process, the problem of data sparsity was alleviated and the performance of suggestion algorithms was improved.

The article proposes a individualized recommendation model for news and communication course resources based on an improved CF algorithm in response to the problem of course resource recommendation in the CAI system for news and communication courses; During the improvement process, the problem of data sparsity was alleviated and the performance of suggestion algorithms was improved; The excellent performance of the suggestion algorithm has been demonstrated through comparative experimental testing and subjective user assessment.

2 RELATED WORK

Chen and Chen [6] use deep learning technology to automatically learn and extract features from financial news data. It extracts key features from a large amount of data and automatically identifies important factors and related relationships in financial news. This technology can provide more accurate and reliable support for financial news recommendation systems, improve user efficiency and satisfaction in obtaining financial information. Using deep learning algorithms, sort financial news based on factors such as content, release time, click through rate, etc. This will prioritize the display of more important news and improve the efficiency of users' access to information. By using the BP neural network sorting algorithm, personalized recommendations are made for financial news based on users' interest preferences and historical behavior. This will improve recommendation accuracy, meet users' personalized needs, and improve user satisfaction. Deep learning algorithms can be used to analyze user comments in financial news, identify public opinion trends and emotional attitudes, and provide reference for investors. By combining deep learning and BP neural network algorithms, sentiment analysis can be conducted on financial news, predicting the impact of news on the stock market, and providing decision-making basis for investors. In short, the dissemination of financial news networks can improve the dissemination effect of news and the decision-making efficiency of investors, promoting innovation. Li et al. [7] implemented the specific functions of student information management, system management, and other modules through a detailed design of the university sports network management system. The application of this system can not only improve the quality and efficiency of physical education teaching in universities, but also provide students with more flexible and personalized learning methods. At the same time, the design of this system can also provide certain reference value for the design of computer-aided teaching network management systems in other disciplines. aims to develop a comprehensive system that combines various

aspects of physical education with computer technology to achieve more efficient and convenient teaching management. The system adopts a B/S architecture and is developed based on web technology, making it convenient for users to operate through a browser. The system provides functions such as user registration, login, and password management. The system provides different permission management for different users to ensure system security and data confidentiality. The system can add, modify, and delete physical education courses, including course names, course descriptions, teaching teachers, and other information. Makhortykh and Bastian [8] may face some challenges in using news recommendation algorithms to report news information on the conflict in eastern Ukraine. Due to the fact that media coverage may involve a large amount of facts and evidence, if only news recommendation algorithms are used to process this information, it may lead to difficulty in evaluating the complexity and reliability of the information source, and may even result in incorrect information being recommended to readers. Due to the use of news recommendation algorithms that may limit people's diverse views and voices on events, it may lead to unfairness and incompleteness in reporting events, further leading to social conflicts and misunderstandings. The use of news recommendation algorithms may lead to media neglecting their social responsibilities and providing overly biased and irresponsible news information solely to attract readers. Meddeb et al. [9] analyzed a personalized intelligent learning recommendation system for Arab users in smart campuses. The system analyzes users' learning behavior, preferences, and course information to recommend suitable learning resources to help them improve learning efficiency and quality. Specifically, the system collects learning behavior data from Arab users, including course learning records, exam scores, online interactions, and course information such as course objectives, teaching content, and assessment methods. Through artificial intelligence algorithms, the collected data is processed and analyzed to understand the learning preferences and course relevance of Arab users, and to establish an association model between users and courses. Generate personalized learning resource recommendation lists based on the association model and course information.

The innovation of computer-aided teaching mode for news communication courses based on improved collaborative filtering algorithms can be achieved by combining the characteristics of news communication courses and the advantages of collaborative filtering algorithms. Mellado et al. [10] analyzed students' learning behavior and habits using collaborative filtering algorithms. For example, the habit of reading news, preferences for different types of news, and difficulties in learning, in order to provide personalized teaching content recommendations for each student. By analyzing students' feedback and interaction, such as answering questions, participating in discussions, etc., teachers can timely understand students' learning situation, adjust teaching strategies, and improve teaching quality. The implementation of a computer-assisted teaching management system for music appreciation courses based on network resources can be achieved using web technology, database technology, etc. The design and implementation of the system should consider factors such as user friendliness, scalability, and security. Through the application of this system, students can be provided with more flexible and personalized learning methods, improving their learning enthusiasm and effectiveness. At the same time, it can also provide teachers with more efficient and convenient teaching management tools to improve teaching quality and efficiency. Pei and Wang [11] manage and organize music appreciation classes more effectively through this system. Students can learn online and enjoy music more conveniently. The system can integrate various network resources, such as music players, music databases, music appreciation websites, etc., to facilitate students' online music appreciation and learning. The system can manage the teaching plan of music appreciation courses, including course arrangement, teaching progress, learning tasks, etc. Teachers can easily formulate and adjust teaching plans, and students can understand their learning tasks and progress. The system can provide the function of online exams, allowing students to take online exams. The system needs to take some security measures to protect user information and privacy. Tahir et al. [12] conducted an electronic learning intelligent learning object retrieval based on collaborative filtering and contextual recommendation. This technology can help students quickly and accurately find suitable learning resources among massive learning resources, improving learning efficiency and quality.

Specifically, the system collects data on students' learning behavior, including elective courses, study duration, test scores, etc. Through collaborative filtering technology, the collected data is processed, students' learning preferences and course relevance are analyzed, and an association model between students and courses is established. Generate personalized learning object recommendation lists based on the association model and course context information. Feedback the recommendation results to students through electronic learning systems or other channels. The advantage of this system is that through collaborative filtering technology, a large amount of student data can be fully utilized to establish accurate association models. At the same time, contextual recommendation technology can fully consider course context information and provide more accurate personalized recommendations. In addition, the system can also be optimized and adjusted based on students' learning feedback, continuously improving recommendation accuracy and user satisfaction. Thakker et al. [13] calculated the degree of similarity between users by analyzing their historical behavior data. Based on the results of user similarity calculation, other users with similar viewing interests will be found and recommended to the target user. These methods generate personalized movie recommendation lists for each user by modeling and analyzing the complex relationship between users and movies. This technology analyzes user behavior data to discover movies that users may be interested in, and then recommends these movies to users based on a certain recommendation algorithm. In terms of multimedia tools and applications, movie recommendation systems can serve as an independent tool or application, or as part of multimedia platforms or streaming services. Through this system, users can more easily find their favorite movies and also discover more potential movies of interest. The advantage of this system is that through collaborative filtering technology, a large amount of user data can be utilized to discover user preferences for movies. At the same time, recommendations can be made based on basic movie information, which can more accurately find movies that meet user preferences. In addition, the system can also be optimized and adjusted based on user feedback, continuously improving recommendation accuracy and user satisfaction.

Tohidi and Dadkhah [14] utilize optimization algorithms recommendation systems. The video collaborative filtering recommendation system is a service that utilizes users' historical behavioral data, such as video viewing records, ratings, etc., to predict their future interest preferences and provide personalized video recommendations. Optimization algorithms can be used to optimize recommendation algorithms. Matrix decomposition is a commonly used collaborative filtering recommendation algorithm that can decompose the interaction matrix between users and videos into two low rank matrices, thereby reducing computational complexity and storage space. Optimizing matrix decomposition algorithms can improve the accuracy and efficiency of decomposition and reduce recommendation errors. Wang [15] utilizes computer corpus technology to provide students with a more efficient and accurate English translation learning environment. Choosing a suitable computer-aided translation software is the foundation of the project. By utilizing computer-aided translation software and organized teaching resources, a parallel corpus for English translation teaching can be constructed. This method comprehensively evaluates coatings by constructing an evaluation matrix of coating properties and considering the impact of multiple coating properties. In the evaluation process, the concept of fuzzy mathematics was introduced, allowing the evaluation results to have a certain degree of fuzziness and uncertainty, which is more in line with the actual situation. This method provides users with more accurate coating matching recommendations by comprehensively considering various properties of the coating, as well as their historical behavior and preferences. Xin et al. [16] use collaborative filtering algorithms to recommend coatings that are similar to or in line with the preferences of users based on their historical behavior and preferences. Computer aided design plays a crucial role in this process. It can help us design more effective recommendation algorithms, Xu [17] optimizes recommendation results by analyzing students' learning data and behavior. Computer-aided design can also help us design more intuitive and user-friendly user interfaces, making it easier for students to use personalized recommendation systems, thereby improving their learning efficiency. This technology provides personalized learning suggestions and resource recommendations for each student by analyzing their learning behavior, learning achievements,

and other information, as well as the content and structure of the course. In terms of computer-aided design (CAD) and applications, this recommendation method can be applied to various teaching scenarios, such as online courses, physical classrooms, adaptive learning systems, etc. The intelligent network teaching system based on the network needs to combine web technology to provide more intelligent, personalized, and convenient online learning services. Zhao and Guo [18] have effectively improved students' learning outcomes and teachers' teaching efficiency through the application of this system, bringing important innovation and change to the education industry. The system needs to design a friendly and easy-to-use user interface that allows users to easily learn and manage. The interface should be clear, concise, easy to navigate, and adapt to different devices and screen sizes. The system needs to provide a learning resource management module that allows teachers to upload and manage various learning resources, such as course materials, video lectures, exercise questions, etc. Zhou et al. [19] solved the problem of traditional collaborative filtering in handling heterogeneous information networks and further improved its performance. Due to the involvement of multiple different data sources in heterogeneous information networks, data sparsity is a common problem. For example, a user may only have a preference for one type of information or item, while not having a clear preference for other types of information or items. This makes it difficult for traditional collaborative filtering methods to accurately predict user interests when processing such data.

3 METHODOLOGY

3.1 Application and Significance of CAI

The reason why CAI should be used in the instructional stage is to improve the instructional effect. Organically combine with traditional teaching concepts and teaching media, enrich the classroom content, create a good learning atmosphere, and promote students' mastery and understanding of what they have learned. Arranging and organizing instructional content is very important for the scientific and reasonable arrangement of instructional content, aiming at students' cognitive body and instructional objectives of the department. When designing courseware, for the instructional objectives, the arrangement of instructional content and layout should be based on the mastery of knowledge by the instructional objectives, and the teaching in the emotional field should be based on the creation of scenes to render the atmosphere.

In real life, the two basic characteristics of news itself and the advantages of contemporary multimedia technology have been effectively docked. In the instructional stage, we should also grasp the basic characteristics of news, rely on advanced CAI means, choose typical examples, and cooperate with the analysis and explanation of theoretical knowledge to make students deeply understand the development, changes and characteristics of modern media. In the environment where multimedia computers learn from each other, learners can choose their own learning content, and they can choose to practice exercises suitable for their own level. In this way, students can participate in learning more actively, give play to their enthusiasm and initiative, and enable students to obtain effective cognition.

Teachers should keep pace with teaching technology, update their own teaching ideas, properly select teaching media, constantly sum up multimedia production and teaching skills, and scientifically and reasonably master the skills of using CAI to serve teaching. Intuitive and vivid CAI can make students enter a lively learning atmosphere. If you have good interest, you will have good learning motivation. It is difficult to achieve the teaching purpose efficiently only by means of traditional instructional methods, and multimedia technology can quickly show the news dissemination course resources to students intuitively and vividly.

3.2 DM of Students in CAI System of News Dissemination Course

With the help of data mining (DM) tools, people can quickly find hidden patterns in data, thus truly embodying the value of data. There is a relatively independent problem in DM, that is, data

modeling. DM modeling needs to be constantly tested by practice, and it is a process that is gradually improved after many revisions. After normalizing the users' ratings, the algorithm adds time factors to improve users' preferences, and fully considers users' own characteristics and users' trust, and finally realizes the design of recommendation system. At present, in the instructional stage of news dissemination course, teachers are still in a relatively backward state in the extensive use of information processing, such as weak information awareness, lack of proficiency in mastering and using modern information tools, and little understanding of the latest theories, methods and trends in the teaching of news dissemination course.

Because users' interests and hobbies are different, the demand for course resources is also different. Individualized service is provided to different users through classification technology, so as to improve user satisfaction. At the same time, the potential user information is mined and the common characteristics of users are extracted, which helps the school CAI system to better understand users' interests, predict their needs and recommend specific curriculum resources to them. The design architecture of CAI system for news dissemination course is shown in Figure 1.

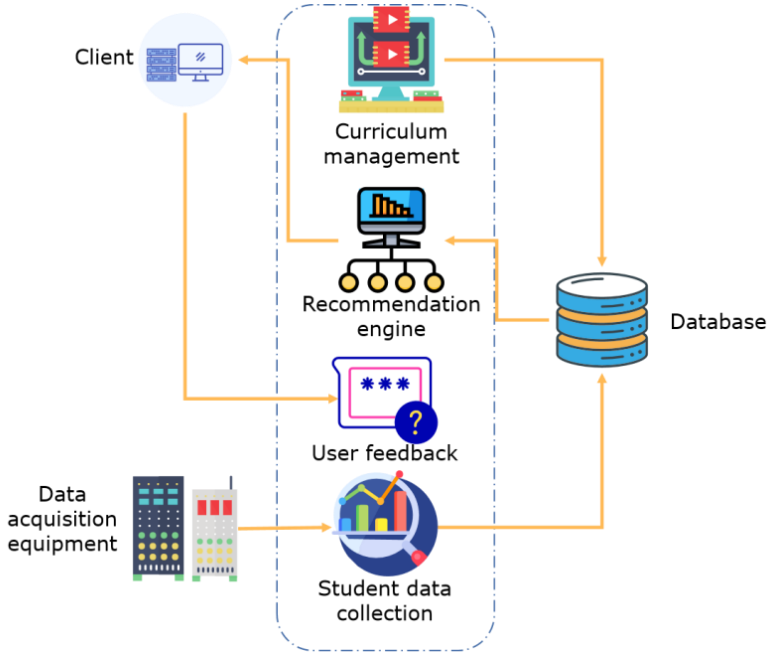

Figure 1: Recommended system architecture design.

All campus network users can access all kinds of course resources through this system, and they can simply obtain these resources. However, the data of the system is massive, so how to find useful information for users from so much data. Based on this, recommendation technology came into being and showed great vitality. Recommendation technology recommends the information that the target user is interested in according to the information that the user has, and helps the user to find the needed information more conveniently.

A common portrait of learning users usually describes learners according to their natural attributes, including age, gender, major, specialty, hobbies, social interaction and educational background. A reasonable and feasible course suggestion algorithm is conducive to providing high-quality course resources for online learning users. To solve the problem that the existing course suggestion algorithms are insufficient in the use of user's characteristic attributes, many course suggestion algorithms fully consider the influence of learners' personal characteristics on

recommendation accuracy, and describe the user's characteristics more vividly by introducing user portraits. Firstly, the student interest model was established according to the user's registration information and user's browsing behavior, and then the student interest preference value was linearly attenuated at regular intervals until. If the user scores an item during the attenuation process, the preference value of the corresponding item is set as the score value.

$$d_{uv}=\sqrt{\sum_{k}^{n}\left|x_{uk}-x_{vk}\right|^{2}} \tag{1}$$

The similarity of students' characteristics is:

$$Sim_{uv}=\frac{1}{1+d_{uv}}=\frac{1}{1+\sum_{k}^{n}\left|x_{uk}-x_{vk}\right|^{2}} \tag{2}$$

Transform the similarity coefficient:

$$Sim_{uv}=\frac{1}{1+d_{uv}}=\frac{1}{1+\sum_{k=1}^{n}\theta_{k}\left|x_{uk}-x_{vk}\right|^{2}} \tag{3}$$

In the early CF recommendation system, users' scoring data of items were selected to calculate users' similarity, so as to predict the items with unknown scoring data and finally produce recommendation results. This memory-based CF suggestion algorithm has been widely used because of its high efficiency and easy implementation. The distribution of users in different characteristics is counted, and the characteristics that greatly affect the accuracy of course suggestion are found, and the prediction score based on statistical user characteristics is obtained by weighted summation of the characteristics.

Fishbein model can be specifically described by the following formula:

$$A_{0}=\sum_{i=1}^{N}b_{i}e_{i} \tag{4}$$

$$\text{support}\left(X\rightarrow Y\right)=\frac{P\left(X,Y\right)}{P\left(I\right)}=\frac{P\left(X\cup Y\right)}{P\left(I\right)} \tag{5}$$

$$confidence\left(X\rightarrow Y\right)=P\left(Y\mid X\right)=\frac{P\left(X,Y\right)}{P\left(X\right)}=\frac{P\left(X\cup Y\right)}{P\left(X\right)} \tag{6}$$

The degree of improvement is expressed as:

$$lift\left(X\rightarrow Y\right)=\frac{P\left(Y\mid X\right)}{P\left(Y\right)} \tag{7}$$

3.3 Improvement of Suggestion Algorithm in CAI System

The purpose of establishing a network resource library is to use the educational resources in it to better serve teaching. The work of recommendation system is essentially data processing, and in this data processing project, it is extremely important to preprocess the original data. Including that the wrong data can be corrected or eliminated, but the missing data must be supplemented or predicted. The purpose of curriculum resource recommendation system is to provide a convenient and quick curriculum resource interface for all learners in the school. The simple ideas behind the recommendation system are as follows: if two users have similar interests, then their favorite projects are also very similar. If users like a project, and the projects are similar, then users may also like it. If everyone likes the project, then a user may also like it. There is no obvious boundary between CF and other methods in recommendation system. Some applications of recommendation methods in recommendation system are realized by combining the idea of CF algorithm.

In the practical application of recommendation system, because the quantity of users and items is huge, and these numbers are constantly increasing with the passage of time, the dimensions of the user-item rating matrix established in this way are large, and the percentage of users' ratings on items is reduced. In most applications, the student's rating data is only a very small part of the whole data set. If the student's rating data for the project is very sparse, it will not only make the similarity calculation costly, but also cause the loss of information when forming the nearest neighbor of the target user or the target project, which will lead to the reduction of recommendation quality. See Figure 2 for the structure of news dissemination course resource management system based on improved CF algorithm.

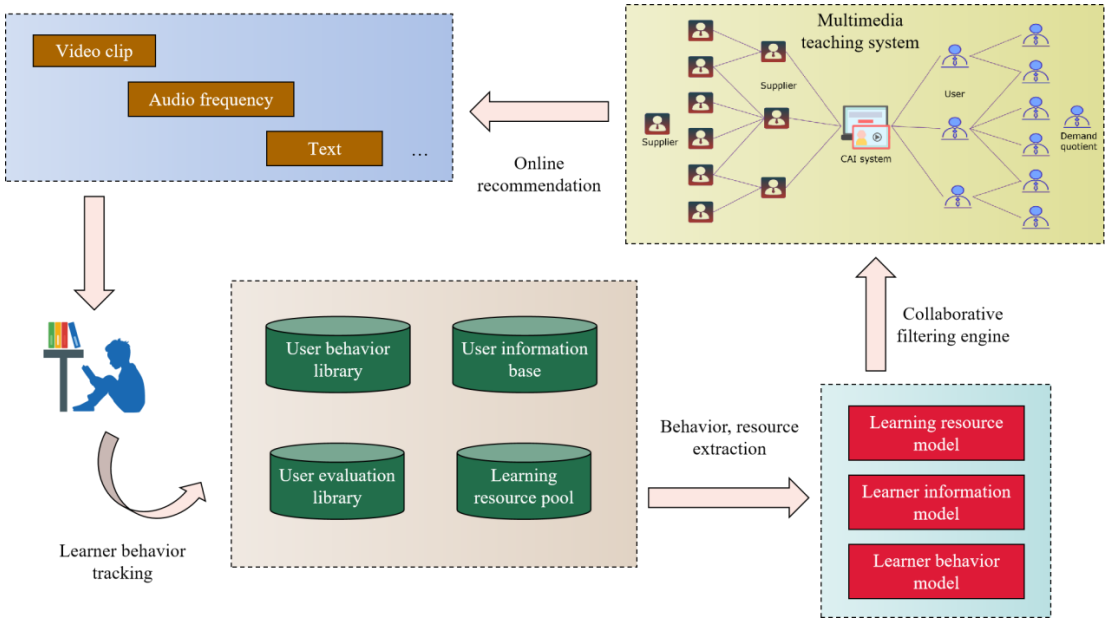

Figure 2: Structure of news Communication course resource management system.

In order to better meet the needs of online education users to choose their own courses, users' own characteristics need to be fully considered in the course suggestion algorithm. However, only relying on historical behavior to obtain interest, there are still shortcomings in extracting users' personal characteristics and accurately grasping users' interest preferences. In a large individualized recommendation system, the quantity of users and items is very large, and the process of generating recommendations is very time-consuming, which makes it difficult to guarantee the real-time performance of recommendations. In addition, data sparsity is also an important factor that restricts the recommendation quality of individualized recommendation system.

Randomly selecting k objects from m data objects as initial centers, and each object represents a cluster center.

$$d(x_i, y_i) = \sqrt{(x_i - x_j)(x_i - x_j)^T} \tag{8}$$

The samples are classified into the most similar classes. Then recalculate the cluster center as a new cluster center:

$$M_j = \frac{1}{N_j} \sum_{x \in w_j} d^2(w_j, x) \tag{9}$$

Finally, repeat the above steps until the value of error function E does not change any more:

$$E = \sum_{i=1}^{k} \sum_{x \in w_j} d^2(w_j, x) \tag{10}$$

Effective use of all student interest behaviors can not only effectively alleviate the problem of new users and improve the learning speed of student interests, but also greatly alleviate the data sparseness of CF suggestion algorithm, thus improving the quality of recommendation.

4 RESULT ANALYSIS AND DISCUSSION

In the practical application scenario, the student's interest preference is a process of gradual change, which is the problem of dynamic change of user preference caused by time factors. In view of the diversity of learning users' course assessment data in different time intervals, the preference data set constructed in the previous step is changed to dynamic change to gradually adapt to the dynamic change of users' interests in course suggestion, which can better realize individualized course suggestion. The advantages and disadvantages of several algorithms in F-Score index are compared, and the results are shown in Figure 3.

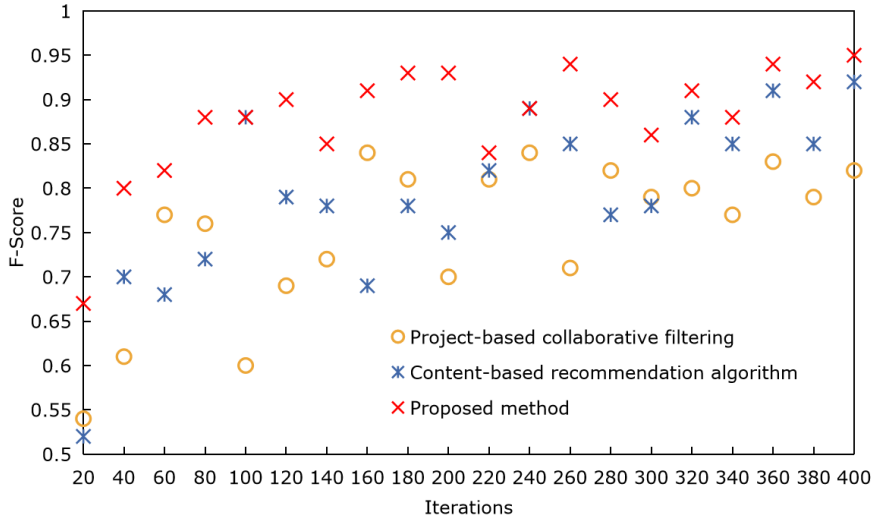

Figure 3: F-Score test.

User behavior can help the system find keywords that users are interested in, but the system can't find all keywords that users may no longer be interested in by analyzing user behavior. Therefore, another mechanism is needed to judge the keywords that users may no longer be interested in and deal with them. The average absolute errors of the two methods are compared by experiments, and the results in Figure 4 are obtained.

CF suggestion algorithm based on resource characteristics uses vector space model to express student's interest, and takes student's interest score on resource characteristics as the basic unit of student's interest. Associating different resources according to their inherent characteristics can solve the problem of new users recommended by CF. Compare the accuracy of the traditional algorithm with that of the improved CF algorithm, as shown in Figure 5.

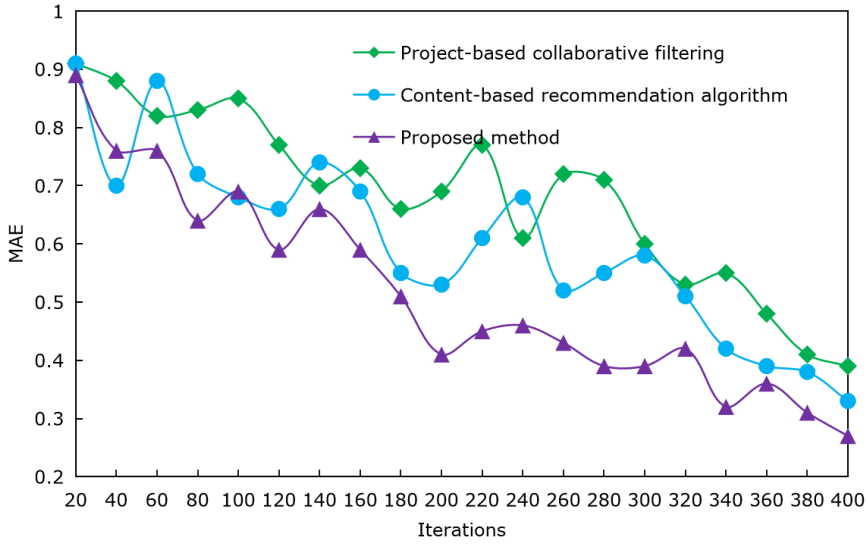

Figure 4: Average absolute error test.

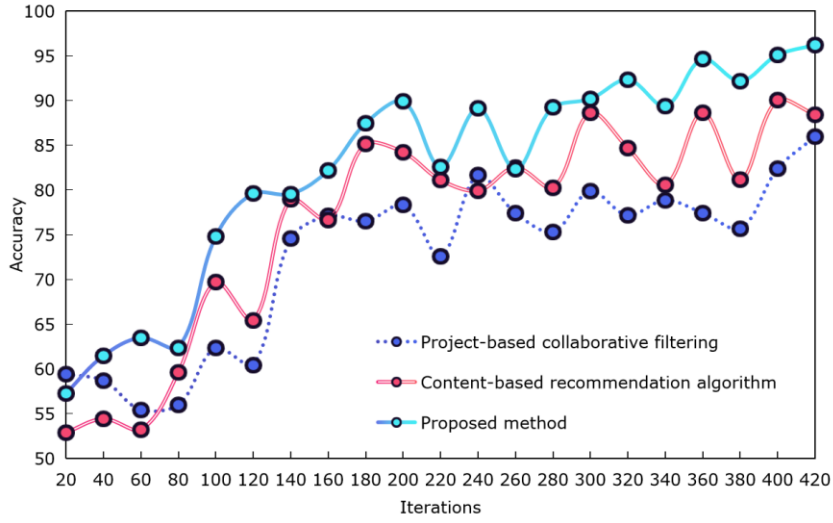

Figure 5: Recommended accuracy test.

Improved CF algorithm has certain advantages in recommendation accuracy. The essence of student interest model is the student's interest score for keywords. Therefore, the process of student interest modeling is the process of expressing student interest as student interest keyword scoring. The standardization of student interest model is to standardize nonstandard student interest data, so as to reduce the interference of user habits on student interest analysis and make it possible to correctly analyze student interests. The model analysis module is responsible for converting the user's historical behavior record into the student's interest description, that is, converting the user's operation behavior on resources into the user's weight score for the corresponding interest keywords, and regularly updating the student's interest weight for the keywords according to the time window principle, so as to provide the recommendation basis for the recommendation module. On the basis of three different time strategy scoring models, the accuracy of using implicit semantic model is shown in Figure 6.

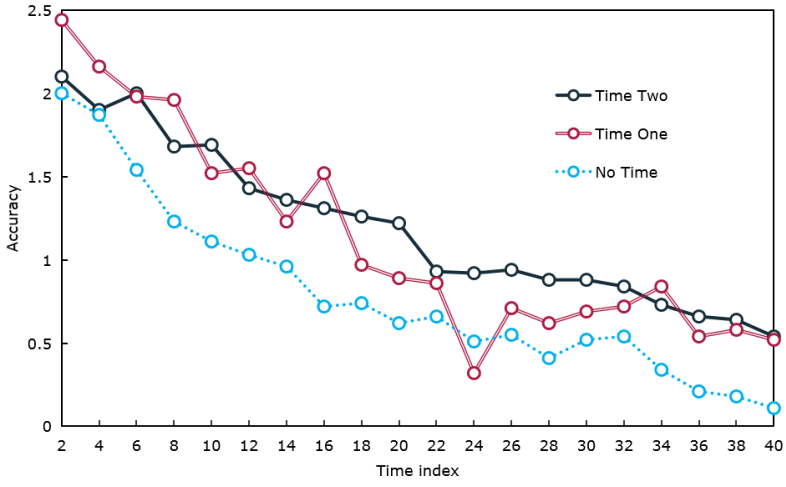

Figure 6: Accuracy of different time strategies.

The search behavior indicates the student's interest in the search keywords, which is the direct interest of the student. Therefore, when the user searches, the weight score corresponding to the search can be directly added to the corresponding student interest keywords without saving the behavior.

The most important function of recommendation system in the relationship with users is to help users have a better and more convenient experience when obtaining information or services on the Internet. In Figure 7, the subjective scores of the improved recommendation system collected from users are shown.

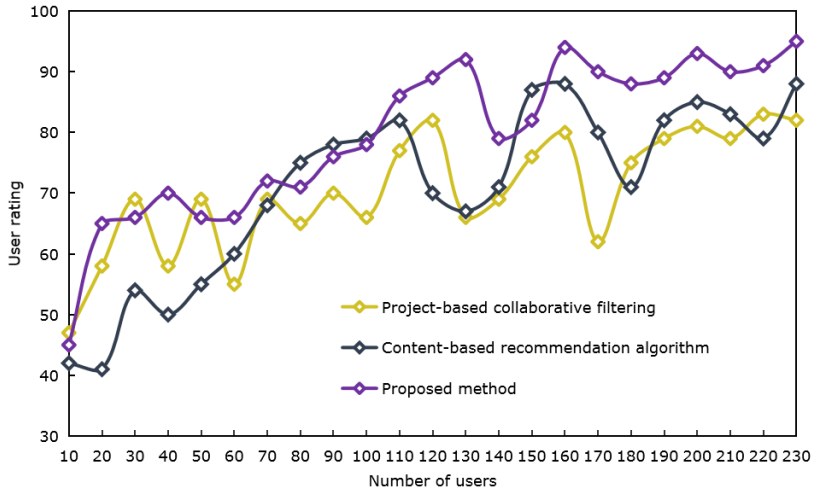

Figure 7: User subjective assessment score.

Compared with traditional methods, educators and learners have higher subjective scores for the system. This recommendation technology is based on the similarity relationship between the extracted information product feature vectors and the project features, and can obtain the similarity relationship and comparison results between projects offline, so its suggestion speed is

fast and it can produce a better user experience. Each mechanism has its own unique advantages and scope of application, and it can play the best suggestion effect under certain circumstances. The change of the actual situation of recommendation system may make the real-time and accuracy of individualized recommendation system face great challenges, and only adopting a recommendation mechanism cannot meet the individualized needs of learners. Therefore, in different situations, we should choose the most suitable recommendation mechanism to generate recommendations.

5 CONCLUSIONS

News dissemination course is one of the main courses of radio and television journalism. The course of news dissemination is both theoretical and practical, which requires students to closely combine theoretical knowledge with the practice of news business. In this article, the CF course suggestion algorithm is mainly improved to solve the problems of new users' cold start, sparse scoring data and complex and changeable user behavior, so as to provide high-quality course suggestion service for users who study journalism and communication courses. The results show that the improved CF algorithm has certain advantages in recommendation accuracy. Compared with traditional methods, educators and learners have higher subjective scores for the system. Through the continuous use of the recommendation system by users, the recommendation system will update its data and adjust the recommendation process of the system according to the changes of users' characteristic attributes and historical behaviors, thus providing better recommendation services for users. The data scale scalability of the algorithm needs to be improved, and the idea of parallel computing can be introduced into multi-feature CF recommendation in the follow-up research to increase the update efficiency of the data in the background computing layer.

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