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RESEARCH ARTICLE

Course Recommendation of College Education Platform Based On Collaborative Filtering Algorithm

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ABSTRACT

Based on the educational informatization paradigm of modern education theory, big data analysis and artificial intelligence of the new engineering system, colleges and universities have formed a student-centered, ability oriented, continuous iteration of qualification evaluation and curriculum quality. This research is based on collaborative filtering algorithm. The main purpose of the project is to provide a platform for students and parents to find the college education that best suits their needs. This will be achieved by considering all factors, such as price, location, facilities, courses provided and other functions, in order to establish a good recommendation system. We have developed most products, but we still need some funds to complete successfully. Our goal is $50000, which will help us create an MVP (minimum viable product) version of the application so that we can get feedback.

***Keywords**: Education platform; Collaborative filtering; Course recommendation*

INTRODUCTION

Smart education system is the product of this background and the new engineering actively promoted by the state. In contrast, traditional college education is teacher centered. American colleges and universities also put forward the new concept of flipped classroom to solve the problem of single and decentralized way, but only partially solved the needs. In order to realize the true decentralization, online education has become a good choice. Although university education has a complete and mature teaching system, it also has the problem of information overload (Su, Tang, & Zhang, 2021). On the one hand, there are many teachers in different schools, and different teachers have different teaching styles, so students will have some problems in the process of course selection. On the other hand, for students who have just entered the University, stepping into a new environment from high school has a certain blindness (Ma, 2021). I don't know what learning path I should follow. Although the school may issue relevant curriculum syllabus and curriculum planning, for people themselves, this way of active acquisition is actually anti human from the psychological level.

The research goal of this paper is how to combine the college education platform and recommendation technology, recommend the video resources that users are interested in according to users' interests, so as to improve the efficiency of users' access to information, conform to users' learning style, and truly form a student-centered goal. At the same time, we should combine the mature knowledge learning path with the recommendation to solve the problem of blind user learning, and form a goal-oriented learning method for users, so as to give full play to the characteristics of the system (Zong, San, & Cui, 2021). This platform first establishes a perfect domain mature knowledge model, and then analyzes the feedback of different behavior characteristics of users to form the final user interest model. Then, through user based

collaborative filtering algorithm, combined with video resource scoring and user interest and knowledge path framework, provide users with high interest and suitable for the next stage of user learning video set. Finally, a set of user goal and interest oriented recommendation system will be formed, which has a very positive role and far-reaching significance in improving teachers' teaching work and students' learning efficiency.

METHODS

2.1. Recommendation System

The literal definition of recommendation system was published on recommended systems by Hal R In the article published by Varian and Paulresnick, it is mentioned that "users often make choices when they lack experience in a certain field or personalized needs. In daily life, we rely on others' suggestions or refer to the comments of mass media. The recommendation system makes use of and strengthens such a social process, which is an application system that can provide targeted and personalized references for users." The recommendation system may rely more on relevant recommendations or the evaluation of some projects as a reference and provide solutions (Liu & Wei, 2021).

As for the formal definition of recommendation system, it was published in IEEE Computer social in 2005 in the article titled "towards the next generation of recommender systems". Alexander tuzhilin and gediminasd adomavicius defined the recommendation system as follows: define a function P, and the function value of function p represents the predicted value of user U's interest in project o, if the project set, user set The recommended set is represented by O, u and R respectively, then the formal expression of this process is: p : u × O → R。 What the recommendation system needs to accomplish is that for each user u ∈ u in the system, the system finds the function result after calculation through a certain algorithm, that is, the system item set with the largest predicted value of user interest is finally recommended to the user. Its expression formula is as follows:

$$\forall u \in U, o_u = \arg\max p(u, o), o \in O$$

The overall process of this research is: the platform analyzes the basic demographic information attributes of student users and the behavior logs of students in the process of using the platform, and refines the user behavior, so as to obtain a relatively accurate user interest model. At the same time, considering the user Ebbinghaus memory curve, we can increase the factor change of user interest attenuation, and finally form a model that meets the requirements of the system model, It can also formally express user demand information (Yang, 2022). At the same time, the system predicts the degree of interest in video resources according to similar users. At the same time, combined with the knowledge model in the learning field, it uses the recommendation algorithm as the bridge between users and video resources, so that high-quality video resources can be effectively exposed. Finally, it can analyze users' behavior and accurately grasp user needs, Make the recommendation results more effective and personalized output (Sun, Fu, & Zheng, 2022).

2.2. General model of recommendation system

Personalized recommendation system is generally composed of three important modules (as shown in Figure 1). The first is the user interest model generated by the analysis of the user's personal behavior data records, the second is the establishment of the recommended item model, and the recommendation engine of the end user interest model and the recommended item model - personalized recommendation algorithm (Wu, 2022).

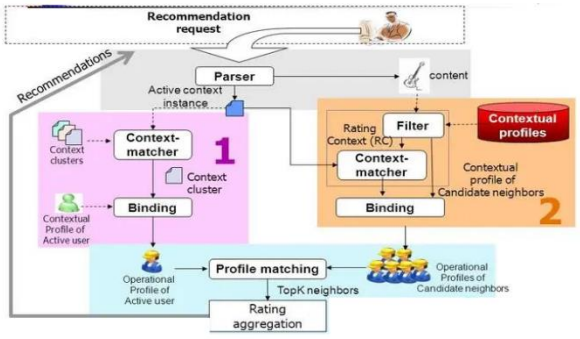

Figure 1. Personalized general recommendation model

Personalized recommendation technology, by studying the interests of different users with a high degree of similarity, can recommend the most needed resource information for users in this way, and then provide a better solution to the contradiction between the annual huge amount of Internet information and the gradual blurring of user needs (Research on the Reform of College Business English Course System from The Perspective of Professional Ability Training, 2021).

RESULTS AND DISCUSSION

3.1. Collaborative filtering algorithm

3.1.1. Introduction to collaborative filtering technology

The first example of collaborative filtering is the experimental mail system, which was born at Xerox Palo Alto Research Center in about 1992. In the Apache mahout algorithm library, there is a specific implementation of collaborative filtering technology, which includes the implementation of collaborative filtering recommendation engine, how to evaluate a recommendation program, how to evaluate the precision and recall, the representation of recommendation data and distributed recommendation, etc (Jiang, 2022). There are three main collaborative filtering algorithms in the algorithm library, which are introduced below:

(1) User based recommendation algorithm this algorithm is mainly based on "user based". First, it finds several groups of users with similar scores to the current user, then finds items that similar users have commented too much but the current user has not commented too much, then calculates the overall preference values of similar groups of users for these items, and finally recommends items and overall preference values to the current user. The recommendation process is implemented by a two-tier for loop, and the outer loop takes the current user's non rated items as candidate recommendations. The inner loop checks the items that have been rated by similar users one by one, and records the item scores. Finally, the weighted average of these scores is used as the current user's prediction of the item's score.

$$P(i,j) = \bar{R}_i \frac{\sum_{n \in Ni} sim(i,N) \bullet (R_{n,j} - \bar{R}_N)}{\sum_{n \in Ni} sim(i,N)}$$

(2) Project based recommendation algorithm: this algorithm is mainly "project-based". First, according to the user's rating data of the project, all users of an over rated project are found as the project vector of the project, and then the similarity between each two vectors is obtained by using the vector distance calculation formula to obtain the project similarity vector, and then all the projects that a user has over rated are integrated, Calculate the user vector of this user. Finally, according to the item similarity vector and user vector, find the n items that are most similar to the item evaluated by a user as the user's recommendation vector, as shown in Figure 2.

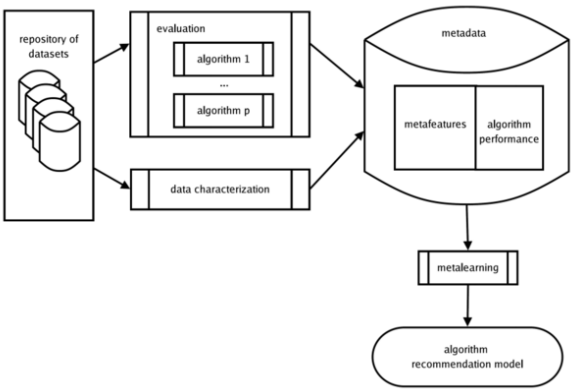

Figure 2. Item based collaborative filtering algorithm

(3) Slope one recommendation algorithm this algorithm predicts the user's score of new items based on the average score difference between the new items and the items scored by the user. The main feature of slope one algorithm is its fast execution speed. Similar to project-based recommendation, its computing speed is not affected by the number of users in the dataset.

3.1.2. Advantages of collaborative filtering algorithm

Collaborative filtering recommendation algorithm must have its advantages. Its main advantages are that this algorithm can automatically process the content that is difficult to be processed by the computer from the user's point of view. In essence, it can classify items differently based on the user's score of a certain item. By analyzing the experience of other users, we can avoid such problems as relatively inaccurate content analysis. We can even filter complex concepts to make it easier for users to understand and make accurate recommendations, which on the other hand helps users of this algorithm find their own potential projects of interest (Tao, Niu, & Fu, 2022). At the same time, this recommendation method can also better automatically complete personalized recommendation. While improving the recommendation efficiency, it can also allow users to give secondary feedback and learn more efficiently.

When the amount of data is large and more information is given to determine users' preferences, user based collaborative filtering algorithms can often show very good performance. However, the shortcomings and disadvantages of this algorithm have gradually surfaced with the development of our Internet industry, the change of site structure, the improvement of content complexity and the increase of the number of users. The main problems are sparsity and scalability. At the same time, some people also pointed out in the research that the traditional collaborative filtering can not reflect the changes of user interests and other problems. Of course, these are also true. At the same time, they do affect the performance of the algorithm, reduce the efficiency of the system, and bring problems to users and platform managers. Therefore, researchers have proposed various solutions to these problems. Among them, there are many scalable collaborative filtering algorithms based on fuzzy clustering, collaborative filtering algorithms based on user level, collaborative filtering recommendation algorithms based on user clustering in personalized services, and so on, which also promote the development of collaborative filtering recommendation algorithms to a certain extent.

3.2. College education platform course recommendation based on collaborative filtering algorithm

The main requirements of the main recommendation system of the college education platform are as follows:

(1) It can recommend video resources that users are interested in and within the scope of users' learning objectives for students to learn;

(2) The recommended list of video resources can be updated in time according to the user's own behavior analysis;

(3) The content that users haven't seen can be effectively recommended, and the cold start problem can be solved.

The following (Figure 3) is the main workflow of personalized video recommendation in the platform, which is mainly divided into four modules: student user management, domain knowledge model, video resource module and recommendation module. In the whole module, the user management module mainly recommends the content through the student's student status information for the first time, and then analyzes the user's behavior characteristics, and finally obtains the user's interest model; As long as the domain knowledge model is to build the relationship between the content of the curriculum system; The video resource module mainly forms the evaluation system of video resources through users' explicit and implicit feedback behavior; Recommendation module is the core of the whole system. Through certain processing, it acts as a bridge between users and video resources, and finally forms the final result through filtering and sorting.

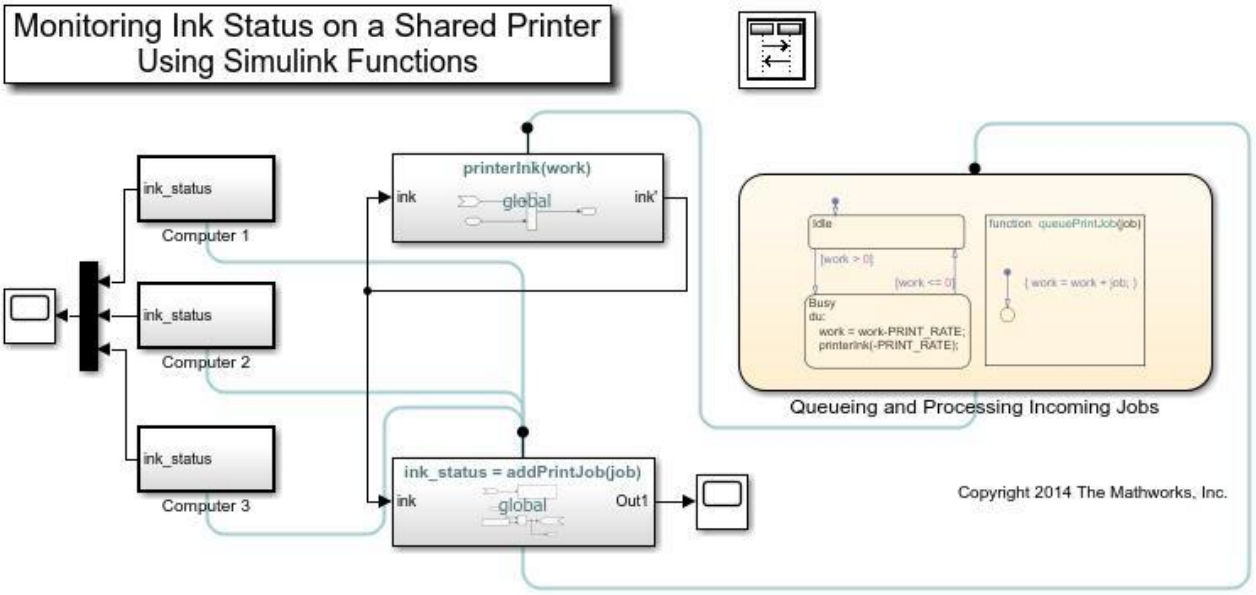

Figure 3. College education course recommendation system

CONCLUSION

The advent of the Internet era has brought new changes to different industries, including the education industry. The emergence of new models, the continuous improvement of infrastructure, and the continuous expansion of network resources make users get more from the vast amount of information resources, but at the same time, it also brings a lot of inconvenience. The continuous increase of resources will lead to the reduction of users' efficiency in information screening. The birth of information retrieval has brought good news, but with the continuous expansion of the amount of information, the same problem is perplexing users again. Fortunately, the emergence of recommendation technology has solved this big problem.

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Key Teaching Research Project of Quality Engineering in Colleges and Universities of Anhui Province, Exploration and Practice of the Theory of Collaborative Education of Finance and Economics Major Curriculum and "Curriculum Ideology and Politics" in the Same Direction

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