Research Design of English Teaching Resource Management System Based on Collaborative Recommendation

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Abstract. Aiming at the "lost" and "waste" of current English teaching resources In order to realize the system, firstly, the use cases of the system are analyzed. Based on the use case analysis, the functions and overall architecture of the system are designed respectively, and the collaborative recommendation module is designed. The combination of For the professional attributes and other attributes of old users, the hybrid recommendation algorithm is used to recommend learning resources. Finally, the partially implemented interface is given.

Keywords: Collaborative recommendation · Resource management · English teaching

1 Introduction

Although English, as a highly professional language discipline, has been very common in all stages and fields of education in China, especially when higher vocational English education has made some achievements, there are still many problems, such as poor practical oral ability and dumb English, which hinder the further improvement of teaching quality. This is mainly because, on the one hand, the teaching means are relatively limited and can only use the traditional classroom time to interact with students. Students have less time to learn consciously after class. Compared with other skill-based disciplines, English learning is not skilled and it is difficult to play an "immediate" role in learning effect. Therefore, students tend to have their own interests and have low enthusiasm for learning after class, It is difficult to improve English teaching continuously; On the other hand, teaching resources are scattered, which makes it difficult for teachers and students to adapt. As a basic subject, there is a wide range of English learning materials to choose from. Students do not know how to choose their own English teaching resources. The individual training of oral English and grammar is also stretched, which further affects their enthusiasm [1, 2]. At the same time, teachers know how to select appropriate English learning materials, but due to the limited sharing means, It is difficult to share English resources to each student in time. It can only be shared and taught in English classes once a few days, which makes good English learning materials

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"overqualified and underused" in a certain range [3, 4]. Students want to learn but can't find English resources, and teachers want to teach but can't share English resources, which makes it difficult to promote the work of English teaching management smoothly. In this regard, there are similar problems in English teaching at home and abroad. Based on this background, it is particularly meaningful to study and analyze English teaching management system which is shown in Fig. 1.

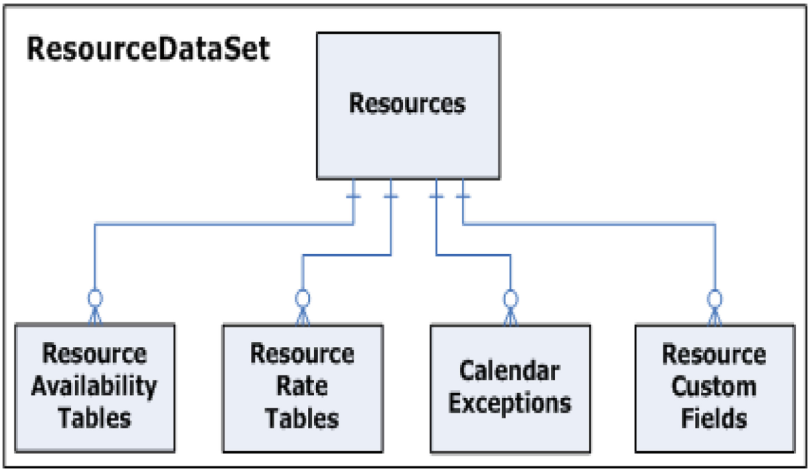

Fig. 1. Relationship for English teaching management system

2 Related Work

(Wu, 2020) introduce the research status of big data and ideological and political education in colleges and universities at home and abroad, USES big data to promote the ideological and political education in colleges and universities, advances the application of big data to college education, and finally summarizes the results and prospects. In order to solve the problems of orderly management, disclosure and evaluation of digital teaching resources, a QR code-based Digital teaching resource navigation system construction plan is proposed (Li et. al., 2020). (Ge, 2020) introduce the design and implementation of new media film and television aesthetics teaching information management system based on Web. In order to improve the management of computer-aided dance teaching resources (Huang, 2021) obtain the key point position coordinates of the human body; The inverse kinematics calculation of the robot obtains the angle values of each joint of the robot, and the angle values of the lower body joints are adjusted to maintain the balance of the robot. Through literature research (Zhu, 2021) find the matching point between constructivism theory and artificial intelligence-assisted teaching, and through the second language acquisition theory and communicative teaching method to summarize the language acquisition process assisted by artificial intelligence. In order to improve the storage and sharing of teaching video resource system in colleges and universities (Yan, 2021) design a teaching video resource management system based on micro grid technology. (Zhu, 2021) propose the design of constructing English teaching resources information management system based on artificial intelligence technology. Other influential work includes (Yang, 2018), (Zong et. al., 2018), (Zhu, 2021).

3 Collaborative Recommendation Algorithm

3.1 Recommended Algorithm

According to the specific business, many different kinds of recommendation algorithms can be selected and applied to the recommendation system. According to the recommendation business and data level to be completed in this paper, the recommendation model selects collaborative filtering recommendation algorithm and K-means clustering analysis algorithm [5].

The collaborative filtering recommendation algorithm is selected because the algorithm itself is very mature, and the difficulty of data modeling is not so high. After some processing of the data, the computational recommendation can be realized. Moreover, in the system with relatively small amount of data involved in this paper, the implementation result of the collaborative filtering recommendation algorithm is also relatively reliable. At the same time, selecting the hybrid model of K-means clustering algorithm and collaborative filtering recommendation algorithm will reduce the amount of computation to a certain extent. K-means clustering algorithm first divides all data into different K clusters, and finds the nearest neighbor users in different clusters as the recommended objects. The collaborative filtering recommendation algorithm is shown in Fig. 2 below.

The most commonly used collaborative filtering recommendation algorithms are user based collaborative filtering recommendation and Project-based Collaborative filtering recommendation [6]. The related algorithms of collaborative filtering recommendation have been well verified and recommended in the recommendation system. Firstly, the similarity between users is calculated through the user's historical behavior data, and the most similar users are found according to the similarity ranking. The result obtained through the weight of the item is the item recommended to the target user. Collaborative filtering recommendation system can deal with unstructured complex data objects, and is often used in film and music recommendation.

3.2 Collaborative Filtering Recommendation Algorithm

Collaborative filtering recommendation algorithm has been applied to real life for a long time, and has been very perfect. The purpose of collaborative filtering recommendation is to recommend information to users. Its core is to calculate and analyze the user's historical behavior data through relevant algorithms, divide different users into groups, and recommend the products liked by users with higher similarity to the group users. The two most commonly used algorithm models of collaborative filtering recommendation algorithm model are user based collaborative filtering recommendation algorithm and Project-based Collaborative filtering recommendation algorithm [7]. The two recommended algorithms will be described and explained in detail below.

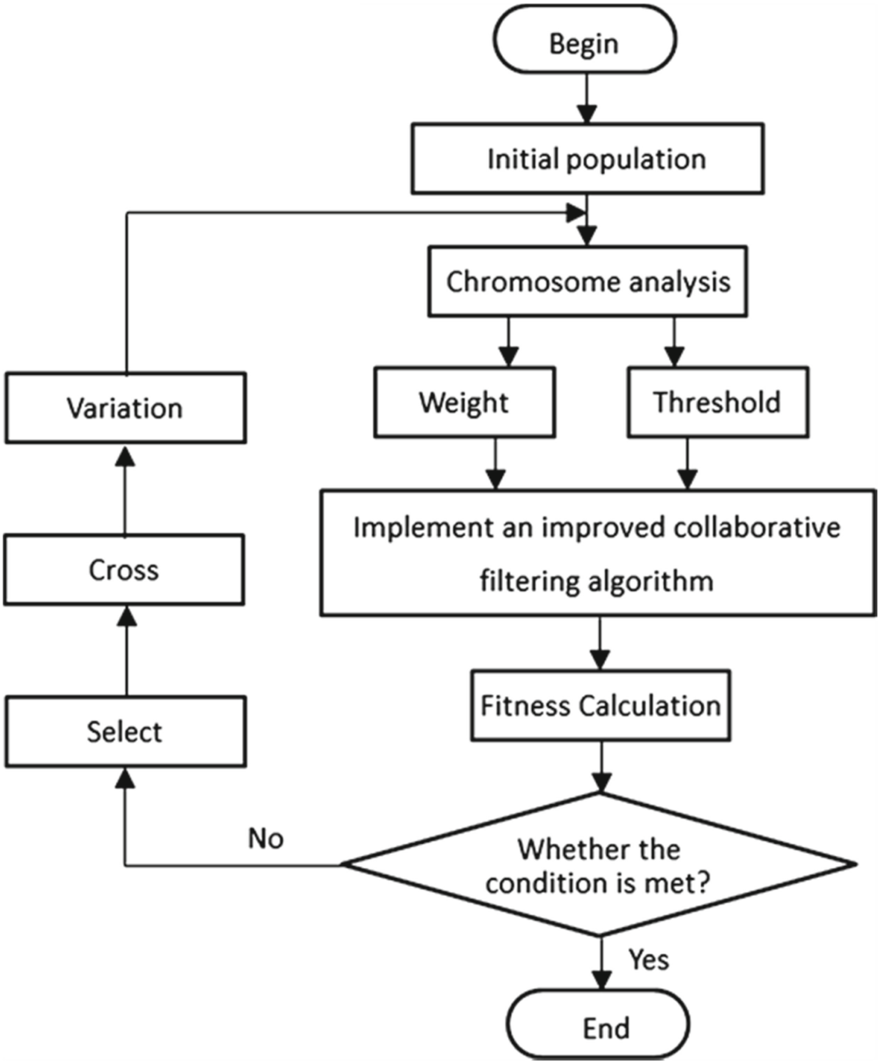

Fig. 2. Collaborative filtering recommendation algorithm

The recommendation algorithm is the core of the recommendation system, but the whole model of the recommendation system must be considered for specific business selection, but the core recommendation engine of the recommendation system will not change. Figure 3 shows the working principle of the recommendation engine:

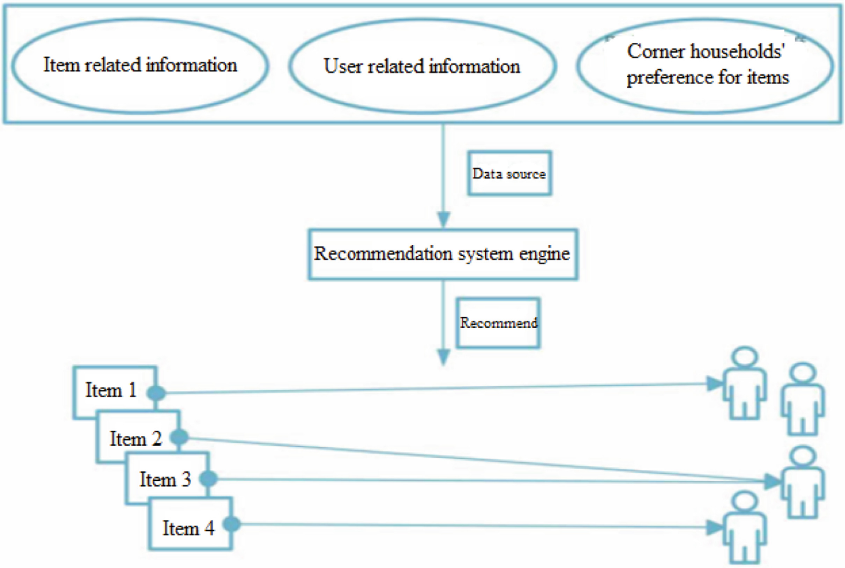

Fig. 3. How the recommendation engine works

4 Design of English Teaching Resource Management System Based on Collaborative Recommendation

4.1 Architecture Design

The overall architecture is built with B/S structure mode. The overall architecture of the system is divided into three layers: application layer, logic layer and data layer [8]. The overall framework system is shown in Fig. 4.

4.2 Recommended Ideas

In the English teaching resource recommendation system constructed in this paper, it mainly includes two important roles: English teachers and students. From the perspective of teaching resources, it contains many types, such as image, audio, video and so on. Therefore, if the traditional association rule algorithm is used to recommend these English teaching contents, it is difficult to make cross domain recommendation. Therefore, the collaborative recommendation model is selected in the recommendation algorithm. In addition, English teaching resources are usually composed of specialty name, resource type, content profile, author profile, upload time and other attributes, while students mainly include student number, specialty code, education type and other attributes. In the recommendation process, it is also considered that students may be interested in teaching resources of other majors in addition to their own majors. Therefore, the recommendation of teaching resources is divided into professional and non professional [9]. At the same time, the score between new and old registered users shall be considered. Different methods are used to recommend different users. In the past

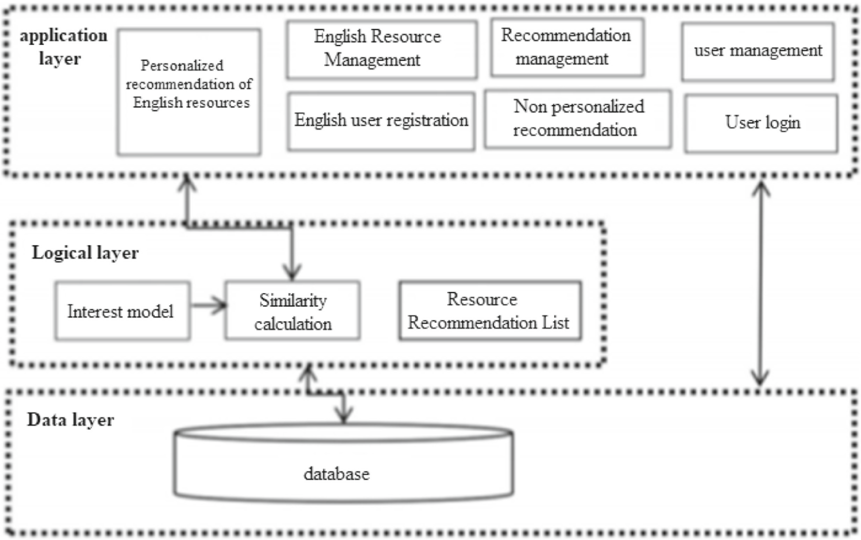

Fig. 4. Overall system architecture

school information construction, schools often only pay attention to the investment of hardware equipment, and the plan and budget are also done according to the hardware investment, and the software cost is rarely included. Due to the lack of attention to the construction of educational software environment, the application level of many built information hardware is not high, and it is not closely combined with teaching practice, so it is difficult to play its due role. The school cannot inherit the effective teaching resources summarized by teachers and students in the past [10]. The following Fig. 5 shows the teaching improvement suggestions.

Therefore, we propose that the construction of teaching resource database system is very important in the process of school information construction. Teaching resource database is not simply collecting and managing text, articles and images. In schools, the teaching resource database is the material basis for education stakeholders to carry out education and teaching work, covering a large number of school administrative documents, teaching materials, courseware, student homework, dynamic materials and so on. And it needs to do orderly classification management, which is convenient for later use.

The construction scheme of mobox teaching resource database system is recommended.

The construction of teaching resource database system is an important part of school informatization [11]. The basic characteristics of school informatization are digitization, networking, intelligence and multimedia; The basic attributes include openness, usability, interactivity and collaboration. So how can we further improve the informatization of education?

There are many practical difficulties in the management and utilization of teaching resource database:

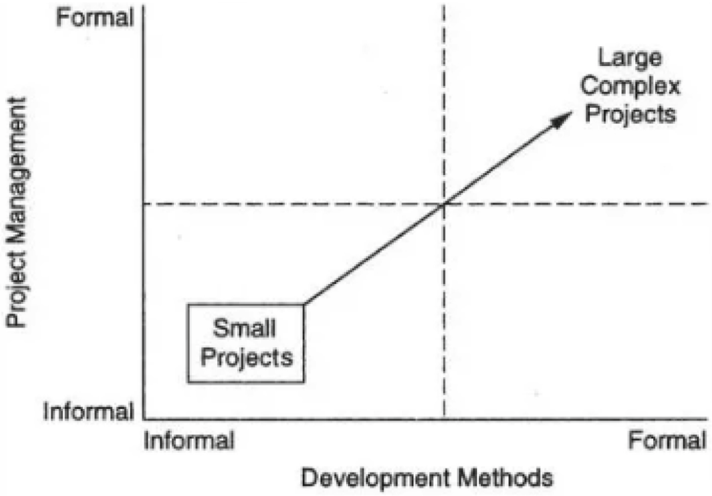

Fig. 5. Teaching improvement suggestions

1) There are many materials in various disciplines and offices of the school, most of which exist in paper form, which is difficult to keep for a long time and find. The time cost of management and application by managers and actual users is very high.
2) The exchange of teaching resources between students and teachers is almost blank. Although there is also the emergence of personal space, the realization of deep-seated sharing and free management of teaching resources has not really been realized.
3) The form of teaching resource database transmission between the majority of teaching staff and management departments is too simple, and it still stays in QQ, email, wechat and other ways. When there are many participants and a large amount of information, the cost of information transmission and management increases sharply. In addition, the statistical cost is unimaginable, and there are great security risks.

The process of building teaching resource database system.

The difficulties in the construction, management and use of teaching resource database platform have become prominent. How to solve them?

After testing, research and demonstration of several private cloud platforms, our school has adopted mobox shared private cloud disk to build the teaching resource database platform, which has achieved good results and greatly improved the management efficiency [12]. The specific performance is as follows:

1) Unified identity authentication

   Mobox can go to the school's ad or LDAP for integrated authentication

   After mobox logs in, it can be integrated with the third-party campus information software. After mobox logs in, it does not need to log in again to enter the third-party information system (the same as the integrated information system).

Mobox has personnel management and authentication services, which can provide each teacher with an independent personal account. Teachers can directly log in to the platform through the link of the portal to carry out relevant work.

2) A simple and easy-to-use hierarchical and decentralized data authority management system

The administrator creates document cabinets of each discipline, grade and department, and assigns the administrator of the document cabinet. In this way, the administrator only creates a large classification, and the detailed directory in each grade or discipline is managed by the administrator of the document cabinet [13].

The management of each document cabinet is subdivided into categories according to the management needs of their own disciplines or grades. When it is complicated, you can assign a directory to a teacher to manage it by yourself.

Relevant access permissions can be set for each document cabinet or directory. (for example, who can see, who can download, who can modify, who can upload, etc.)

There are management and sharing problems that cloud disk cannot solve.

3) Management and use of teaching resource database

It is very convenient to solve the difficulties in the distribution, recovery, download, statistics, sharing and other links of traditional teaching resources [14]. The cost of teaching resource database management is greatly reduced, and teachers' enthusiasm to use teaching resource database for teaching is increasing day by day, which is more convenient than the traditional one. Figure 6 below shows the load organization of the resource manager system.

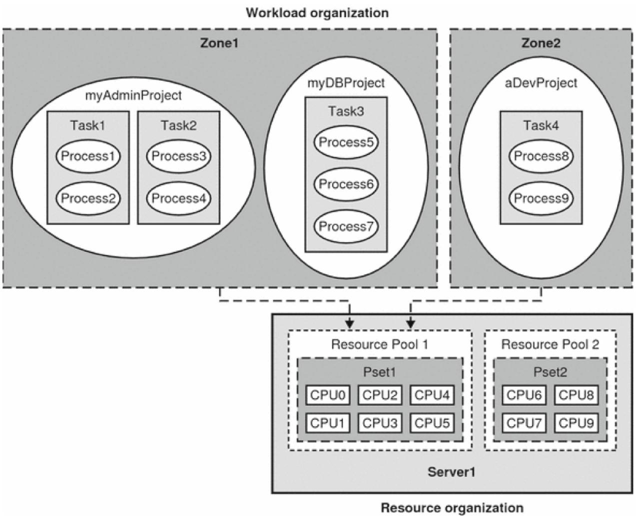

Fig. 6. The workload organization for resource manager system

5 Conclusion

To sum up, a teaching resource management system with collaborative recommendation function is the key to solve the current excessive accumulation and low efficiency of teaching resources. This paper introduces the collaborative recommendation algorithm into the teaching resource management system to recommend different types of teaching resources to applicable users. The collaborative recommendation teaching resource management system is composed of personal space management, resource management, recommendation module and system management to meet the different functional requirements of users in different roles, so as to improve the sharing and utilization of teaching resources.

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