

Design and Implementation of English Teaching Resources Retrieval Algorithm Model Based on Deep Learning

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Abstract: With the development of computer network and information technology, the requirements for educational environment have been further improved. At present, there are web-based examination systems in almost every field. Especially English learning, because students go from primary school to university, and even study abroad, English plays an important role in all kinds of examinations, and for this reason, all kinds of online learning have appeared. However, almost all English learning systems cannot improve students' interest and efficiency. Through the analysis and comparison of the matching degree between learners' interest and resources, an algorithm model for realizing accurate resource retrieval is put forward and verified in related systems. At the same time, this algorithm has a good reference value for realizing personalized recommendation of resources. With the emergence of various resource information bases, it is an urgent problem for every resource information provider to find the resources that users are interested in from the massive resource information bases. In this paper, we propose an algorithm to achieve accurate resource retrieval by comparing the matching degree between user interest model and information resource model, and implement it in related systems. The algorithm also has a good reference value for personalized recommendation of resource information.

1. Introduction

In recent years, a large number of resource information databases have emerged. In the face of these massive resources, users are often at a loss because it is difficult to quickly find the resources they are interested in. Over time, users lose their interest in using these resource information databases [1]. Therefore, in addition to a large amount of high-quality resource information, an excellent resource information base must also provide an excellent search engine that allows users to quickly and accurately find the resources they need, which is also the focus of each resource information base provider. However, at present, most of the search methods used in many resource information databases are SQL queries based on relational databases. For example, many wildcards and like queries are used. There may be thousands of results in one search, but few of them are useful. English process teaching management focuses on the examination of students' usual

performance, pays attention to the cultivation of students' application ability, and changes the previous assessment method of determining the advantages and disadvantages of one volume. The performance of manual assessment and calculation is not easy to quantify and the workload is large. This system is designed to solve these problems. The design of the system focuses on simplifying teachers' methods of students' process performance and improving work efficiency. With the improvement of China's international cultural level, the universality and importance of English have become increasingly prominent [2]. With the rapid development of technology and the characteristics of language learning, mobile language learning is becoming more and more popular, which has become an important way for people to learn. Mobile devices have the advantages of universality, portability, autonomy and timeliness. This paper focuses on English learning system, which has application value. Firstly, it analyzes the problems existing in the current English learning platform, mainly the lack of intelligent theoretical support, which leads to the inability of students' learning efficiency to be improved. Then it analyzes the requirements of the system, analyzes the main functions of the system from the perspective of users, and analyzes the performance requirements of the system. The overall architecture of the system is designed, and the functional modules are designed in detail. The focus is to introduce the project response theory based on the existing test question selection strategy, and put forward and discuss the new topic selection scheme in detail. The function of English learning platform is realized by programming language and tested. The application of item response theory in English learning platform can adaptively adjust the next learning content according to the students' mastery of knowledge, and intelligently select topics to organize test papers, so as to improve learning efficiency. The analysis and presentation of students' learning data on the English learning platform helps students to correctly evaluate their own level [3].

2. Design of Resource Retrieval Algorithm Based on User Interest Model Matching

2.1 Design of Resource Retrieval Model Algorithm for Learners' Interest

When using the resource information base, each user has his own specific information needs. These information requirements are expressed as information filtering conditions. By filtering the resource flow, the content that meets the requirements of the resource flow can be extracted to provide services. This method is called resource information retrieval. The essence of information retrieval or filtering is to establish the matching between user interest model and information resource model. Users with high matching degree are closer to users' interests than users with low matching degree [4]. When using the resource information base, each user has his own specific information needs. These information requirements are expressed as information filtering conditions. Filtering resource flow can extract the content that meets the requirements of service resource flow. This method is called resource information retrieval. Learners' interest matching degree of information retrieval is lower than learners' interest matching degree of information retrieval. The user interest model can be represented by vectors:

$$I = (I_1W_1, I_2W_2, \dots, IW_n) \quad (1)$$

The semantics of user's interest keywords are usually related to the information fields and information resource models searched by users. Take Shanghai Education Resource Database (hereinafter referred to as SHERC) as an example: users may be interested in resources with specific keywords or resources provided by specific authors. The information resource model can be represented by vectors:

$$R = (R_1W_1, R_2W_2, \dots, R_n W_m) \quad (2)$$

The correlation between this resource and interest is expressed as:

$$d = \sum_{j=0}^m \left(W_j \times \sum_{k=0}^n D_{kj} \right) \quad (3)$$

The above correlation algorithm is used to query and filter the resource record set, and the related resource record set (the set of all resource records with correlation degree $d > 0$) is obtained. The record set is sorted according to correlation degree, and the user's interest and resource correlation degree are ranked first. The realization result of this model: the accuracy of resource selection and description is high, and the scalability of user interest collection is strong, which can ensure a high precision rate. Its innovations are as follows: (1) A model based on the interest set of complex users. (2) Multi-feature resource description and resource selection model [5]. An accurate retrieval algorithm of educational resources based on learner's interest model matching is realized. This work is the first step to realize personalized recommendation of educational resources. If the system establishes a learner's interest set by automatically recording the learner's visiting behavior analysis and automatically recording the query habits, and then searches for resource information that matches the learner's interest according to the learner's interest set or the information system browsed by the user groups with similar interests, it can provide personalized resource recommendation service for each learner or each kind of user. This idea can also be applied to personalized recommendation service of portal website information.

2.2 System Architecture Design

When using any system, user requirements will certainly change. In order to achieve high scalability and easy maintenance, the system adopts the B / S structure design of MVC architecture. All logic is completed on the server side, so the upgrade and maintenance cost of the client can be saved when updating the version. The system uses asp net as the server-side development language, SQL Server 2008 as the database management engine and IIS as the web server. The system adopts three-tier architecture. Among them, the view layer is used to build the system interface, collect the operation results of input and output programs, and realize the interaction with users. Bll layer is used to encapsulate all system functions and display of scheduling view layer [6]. The DAL layer is used to read and write databases and profiles and is responsible for data interaction. The model layer is used to describe the entity data between layers. In the process of database design, BC paradigm is taken as the norm, which not only avoids data redundancy, but also avoids the functional dependence between data. Each data table adopts the automatically growing integer as the primary key, which can not only avoid entity duplication, but also facilitate the establishment of index and improve the retrieval speed. There are 14 tables in total. Take the student table structure in Table 1 as an example to show the design results.

Table 1 Student Table

Serial number	Field name	Data type	Remarks
1	ID	Int	Principal linkage
2	Name	Nvarchar(20)	
3	Sex	Bit	
4	Classid	Int	External key
5	No	Varchar(20)	

The purpose of system functional requirement analysis is to obtain the requirements of different role participants for system functions through the analysis of system participants, so as to summarize the functional indicators that the system has. The method of system functional requirement analysis is to first determine the participants of the system, then analyze the main

functions of the system according to the main purpose of participants using the system, give the use case diagram, and then analyze the main use cases in detail. Teachers' participants in the English teaching platform mainly publish and classify relevant English teaching resources through the system, and master students' learning situation, so as to provide better English teaching services for students. Teachers' requirements for the main functions of English teaching platform include: I hope that the system can provide the publishing function of learning resources, which is the basis of the operation of English learning platform. Teachers are responsible for publishing the resources that students need, and the contents of these resources should cover all fields of English learning. When publishing resources, they should be able to add the related attribute information and label information of resources, so that the system can automatically classify the resources. It is hoped that the system can provide the input function of exercises and questions. The system should provide the input template of questions, so that teachers can choose the template according to different types of questions, and improve the input efficiency of questions by copying and pasting. At the same time, the system should provide the setting function of question parameters, so that teachers can set the difficulty, discrimination, guessing degree and other parameters of each question according to the relevant requirements of project response theory, so that the system can automatically apply the topic selection strategy to test students' questions. The system should be able to make statistics and summary of students' overall learning situation, and generate reports according to certain templates, so that teachers can better grasp the changes of English learning in our school; It is hoped that the system can provide a platform for communication between teachers and students in schools. Students can ask questions to teachers through the system, or students can communicate with each other. Teachers can give answers to students' problems in the learning process. Teachers use, for example, Figure 1.

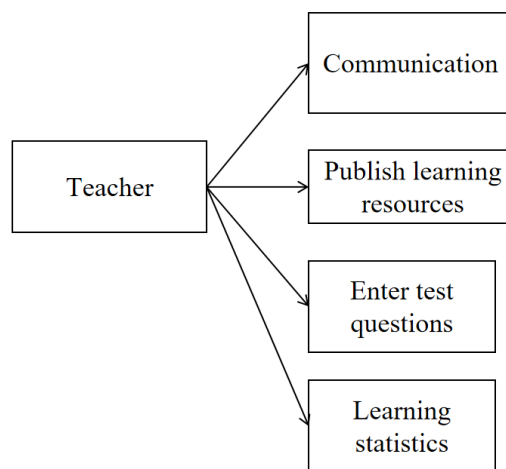


Fig.1 Teacher Participant Use Case

3. Design of Adaptive Project Response Rules

3.1 System Implementation

LINQ is Visual Studio 2008 and .NETFramework3.5 version 3.5. It simplifies the interaction between object-oriented programming and relational data by applying the principles of object-oriented programming to relational data. LINQ to SQL layer: LINQ can quickly create objects based on the database table structure and create relationships between objects according to the relationships between tables. It realizes the operation of database tables and the mapping between tables and objects. LINQ to SQL classes can quickly build DAL layer and model layer. After the

construction, you can call the data entity through the object-oriented method and access the data in the database through the syntax similar to SQL [7]. Linqto SQL class provides a way to quickly build DAL layer and model layer. Bll layer is built based on DAL layer and model layer. The principle of construction is to create a class for each data table to deal with various operations of the data table, including data addition, deletion, modification, query and system logic functions. Class corresponds to an operation. When adding new functions to the system, just add classes or methods to realize the new functions without affecting the existing functions. The implementation of view layer adopts ASP Net to develop web applications. The input and output of users are realized through various web server-side controls. Because the Bll layer realizes all the business logic of the system, the developers of the view layer can focus on beautifying the system interface and improving the user experience. User requirements include functional requirements, non functional requirements and binding requirements. Functional systems should be designed according to the reasonable needs of users to complete specific functions. Non functional requirements may be proposed by the system analyst when checking the system performance, including the reliability, security, scalability and response time of the system. In addition, it also includes some constraints that must be considered, namely constraint requirements, including customer constraints, legal constraints, industry constraints, etc. The overall design scheme gives the overall structure, overall technical architecture and front and back desk process of the system. According to the needs of users, the overall structure of the system is mainly divided into foreground and background. The front desk includes modules such as user login and registration, online examination, memorization and word translation. The background mainly plays a management role, such as English data management, user management and system management. The overall technical architecture of the system is based on MVC layered design mode, and the relevant layers are designed respectively, including model layer, view layer and control layer. The design of the view layer uses the UI provided by Android, the control layer uses Servlet Technology, and the database access uses jdbc driver. Overall technical architecture of the system [8]. System manager participants are different from teaching manager participants. The teaching administrator mainly configures and manages the business, and the system administrator configures various operating parameters of the system itself. Tu enables the system to run smoothly according to the needs of users. The system administrator mainly manages various user information and configures permissions and parameters through the system. The main functional requirements include: I hope the system can manage school users, treat a school using the system as an independent user, maintain relevant school information, and configure the use authority of school users; It is hoped that the system can provide the communication function module between the system administrator and the teaching administrator of each school, and can realize the information interaction by means of instant messaging, e-mail, SMS and so on, so as to improve the management ability of the English learning platform. It is hoped that the system can provide the function of configuring global parameters of the system. English teaching platform is not only for one school. After configuration, the platform should be able to provide English learning services for multiple schools at the same time. The configuration of global parameters will have an impact on English teaching platforms in all schools. The use case diagram of system administrator participants is shown in Figure 2.

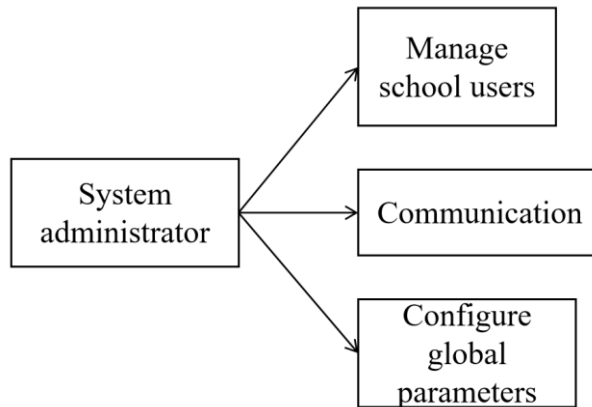


Fig.2 Use Case Diagram of System Manager Participants

3.2 System Test and Implementation

Testing is the main way to ensure the normal operation of the system. The system is tested and analyzed through practical application. The system is used for English online examination [9]. Step 1: students open the “English online answer system”, browse the test news after entering the home page, and then enter the “user login interface”. Step 2: students enter their name, examination number and password in the “login interface” and enter the “examination module home page”. Step 3: students select the grade to be tested in the “select test page” and enter the “test page”. Step 4: students take the exam in the “exam interface”. Press “I want to hand in my paper” after finishing the answer. Step 5: students can query the test scores through the score query module. The test of this system has been unanimously recognized by students and teachers. From the running effect of the system test, it can basically meet the design requirements such as the establishment of test question bank, the random generation of test questions, and the online submission of test answers. It can realize the informatization and automation of English examination, reduce the workload of English examination and effectively improve the efficiency of examination [10]. The English test scores of a student are shown in Figure 3.

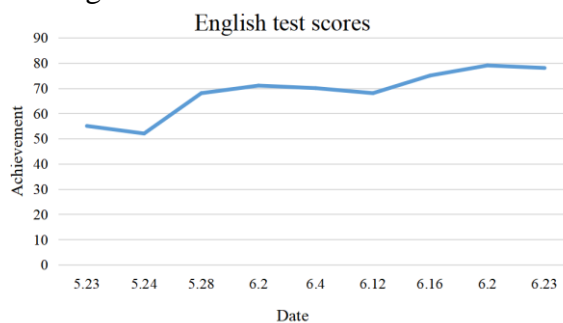


Fig.3 A Student's English Test Score

4. Conclusion

The application of information technology in the education industry is more and more extensive, and the development of network technology enables students to realize distance autonomous learning. There are various English teaching platforms based on the Internet, which provide functions such as learning knowledge points and online testing. However, from the current situation, there are some problems, such as poor universality, self-adaptability of test selection strategy, and

lack of display of users' learning situation. In a word, English teaching from the perspective of constructivism is a long-term teaching process, and it is also a new teaching method that can help English teaching to open up ideas. In the process of teaching, teachers should give full play to their advantages, constantly improve the constructive teaching, activate the teaching atmosphere in English class, and help students integrate into the English learning atmosphere. The method of using LINQ To SQL class to generate DAL layer and Model layer in the process of system implementation greatly simplifies the development work and shortens the development cycle. Using process teaching to manage students' excellent English courses is of great help to improve students' English ability. At the same time, this system simplifies teachers' work in process teaching management. Therefore, this system has double significance for improving teachers' work efficiency and students' English ability.

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