

Research Article

Application of Internet of Things in Online Teaching of Adult Education Based on Android Voice Assistant

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Adult education is an important part of lifelong learning; with the rapid development of economy in recent years, the society has put forward many new requirements for lifelong education; and many new problems have emerged in adult higher education. Online education is the medium of distance learning. Due to the continuous development of Internet+ and the continuous growth and rapid development of online education, it provides unprecedented opportunities for the development and utilization of high-quality education resources. Based on the research on the recommendation method of online courses in adult higher education, this paper designs and develops an online education platform for Adult Higher Education. The intelligence of mobile devices has made mobile phones an indispensable device in people's lives, excellent human-computer interaction design, and open-source kernel code that make Android the best choice for developing mobile applications. Therefore, in this paper, we will build an adult online education framework based on Android voice for Internet of things technology, design a monitoring node for Internet of things, design and implement an online education monitoring system for adult NB people, and research, collect, and send the learning status information of Internet of things technology. The results show that the function of the system can be effectively realized, the operation efficiency is high, and the personalized course design can be provided.

1. Introduction

This paper analyzes the actual needs of adult education and studies and designs a relatively perfect online education network platform [1]. The subjects selected by students mainly include the integrated management subsystem of adult higher education, the network education subsystem of adult higher education, and the personal process suggestions and mobile education app. According to the needs and analysis, the detailed design is carried out, the scoring process of the subject is analyzed, and the recommended methods for the personality chemistry subject are put forward according to the relevant rules and cooperation [2]. According to the data selected by students in the past and the existing course information, the method can meet the basic requirements of recommended courses. Based on the B/S model of adult higher education, using the aspnet technology that is designed in detail based on the above needs analysis, to achieve student payment, system role setting and permissions, student online learning, and personal process.

At the same time, we have developed an online education platform, which has key functions such as recommendation and mobile learning [3]. Android voice assistant has important theoretical value and broad application prospects and has made continuous development in recent years and has aroused great interest [4]. The research of artificial neural network greatly improves the accuracy and speed of speech recognition. In addition, Android language assistant technology has been moved to the commercial system of the laboratory, gradually affecting and improving people's work and life. BP network represents the most important idea of artificial neural network. Now, BP network or its variants have been basically used in the practical application of neural network. Nowadays, mobile phones can directly understand people's language and complete people's ideas without manual operation. It is the main development trend of intelligent device application. Android voice assistant realizes input, query, and control functions for some mobile phone users through voice interaction [5]. General applications such as voice input method can not only improve the

input efficiency but also leave space in some special environments to meet people's input needs. In this paper, we will first explain the background of the theme, such as the development of adult education, the Internet of things, Android speech recognition technology, the development status at home and abroad, the research content, and purpose [6]. This paper designs an online adult education system based on the voice support of Internet of things database, which solves the problem of adult education to a certain extent [7].

2. Related Work

This paper introduces the application program of computer web end to design system database. These application programs realize the functions of real-time system monitoring, real-time query, history query, route maintenance, and user management [8]. The database of attribute graph and system table related to entity is introduced. This paper introduces the basic structure and algorithm principle of artificial neural network, designs it according to the characteristics and learning rules of BP neural network, and realizes the algorithm of limited command recognition [9]. Then, according to the concept of software engineering, it determines the storage of mobile phones and recording files, Android Bluetooth communication, interaction between client and server, query and change of database, software requirements, and functions of mobile phones and SMS. Finally, it is based on Android platform, combined with speech recognition algorithm, and realizes all functions of supporting speech software [10]. This paper introduces the construction and development status of online education platform at home and abroad, analyzes the actual needs of industry lifelong education and online education, and designs the overall design of online education platform based on the current network platform, establishes the infrastructure, application foundation, and needs analysis [11]. Among them, the design of information portal system is complete and specific, including learning resource management, cloud course management, course learning preparation, online learning management, and academic performance evaluation. This paper deals with learning, learning resource management module related to the evaluation of education quality, in response to the actual needs of education management, departments, courses suitable for positions, learning placement module, and so on [12]. The management module of system classified examination question bank is designed in order. This paper introduces the user organization management using hierarchical tree structure, the task management suitable for enterprise employee mobility, the role management of various personnel permissions, the correlation with examination practice and pre education, and introduces the actual needs of education management in continuing education [13]. The systematic knowledge of conditional learning resource management, department and professional title course arrangement, examination question bank management, and examination preparation. In order to carry out the classification of curriculum set and the issue and

management of Graduation Certificate in a sustainable way, it provide flexible, convenient, and fully functional online education and training services for all types of professionals. Through design and testing, the education network provides effective plans for education and training, improves the traditional face-to-face education and training with excellent technical ability and rich scientific knowledge, and provides us with all kinds of technology and scientific knowledge [14]. The service is provided by excellent management technicians and managers in the industry. The literature introduces the convenience of lifelong learning brought by the establishment of network education platform, but the network education platform also faces some problems [15]. First of all, the operating cost of the platform is relatively high, and it needs continuous investment to upgrade and improve to meet the continuous education needs of online education (including purchase), including hardware cost. On the other hand, the cost of high-performance server, the use of high network bandwidth, and human resources, including a large number of teaching material production, development, software system maintenance, and troubleshooting. Second, some functions of the platform are incomplete. For example, it can only be used on Windows system on PC and does not support Android system, IOS system, tablet computer, and mobile phone client. Moreover, the resources of teaching materials are still very limited. Participate in more training and educational institutions in the operation and management of the platform and make the best use of the functions of the cloud platform for resource sharing [16].

3. Research on Android Voice Assistant

3.1. Process Design. The application must run in the background to use all the functions of the software. If we open the software for the first time or close it carelessly when using it, we can search among multiple applications in the list without operating the mobile phone. Just double click the volume up button on the Bluetooth ear to start using it, and the voice will prompt the user. At the same time, according to the setting information, start the phone and SMS monitoring service to ensure the various permissions required by the offline table, and the application program completes its functions. The flow chart of software startup process is shown in Figure 1.

3.2. Algorithm Principle. Artificial neural network is a large parallel distributed processing system with receiving experience and available functions, making artificial sound detection system an important choice.

Neuron k :

$$\begin{aligned} u_k &= \sum_{j=1}^m w_{jk} x_j, \\ v_k &= u_k + b_k, \\ y_k &= f(v_k). \end{aligned} \tag{1}$$

Linear activation function:

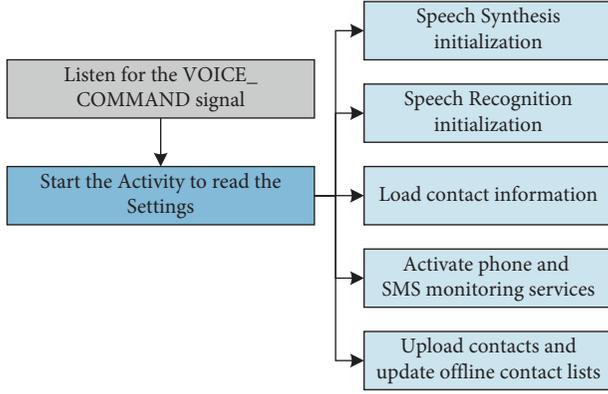


FIGURE 1: Process of software startup.

$$y_k = f(v_k) = Kv_k. \quad (2)$$

Threshold logic activation function:

$$y_k = f(v_k) = \begin{cases} 1, & v_k \geq \theta_k, \\ 0, & v_k < \theta_k. \end{cases} \quad (3)$$

Type logic activation function (Sigmoid function):

$$y_k = f(v_k) = \frac{1}{1 + \exp(-v_k)}. \quad (4)$$

Hyperbolic tangent activation function:

$$y_k = f(v_k) = th(u_k). \quad (5)$$

The output of the hidden layer neuron is

$$z_k = f_1\left(\sum_{i=1}^n v_{ki}x_i\right) k = 1, 2, \dots, q. \quad (6)$$

The output of the output layer neuron is

$$y_j = f_2\left(\sum_{k=1}^q w_{jk}z_k\right) j = 1, 2, \dots, m. \quad (7)$$

The error E_p of the p -th sample is

$$E_p = \frac{1}{2} \sum_{j=1}^m (t_{pj} - y_{pj})^2. \quad (8)$$

For all samples, the global error is

$$E = \frac{1}{2} \sum_{p=1}^P \sum_{j=1}^m (t_{pj} - y_{pj})^2 = \sum_{p=1}^P E_p. \quad (9)$$

The BP algorithm is used to adjust the weight of the output layer in order to reduce the global error E . The amount of change is as follows:

$$\Delta w_{jk} = -\eta \frac{\partial E}{\partial w_{jk}} = -\eta \frac{\partial}{\partial w_{jk}} \left(\sum_{p=1}^P E_p \right) = \sum_{p=1}^P \left(-\eta \frac{\partial E_p}{\partial w_{jk}} \right). \quad (10)$$

Define the error signal as follows:

$$\delta_{xj} = -\frac{\partial E_p}{\partial S_j} = -\frac{\partial E_p}{\partial y_j} \cdot \frac{\partial y_j}{\partial S_j}. \quad (11)$$

For the first item,

$$\frac{\partial E_p}{\partial y_j} = \frac{\partial}{\partial y_j} \left[\frac{1}{2} \sum_{j=1}^m (t_{pj} - y_{pj})^2 \right] = \sum_{j=1}^m (t_{pj} - y_{pj}). \quad (12)$$

Partial differential of the transfer function of the output layer is as follows:

$$\frac{\partial y_j}{\partial S_j} = f'_2(S_j). \quad (13)$$

Then,

$$\delta x_j = \sum_{j=1}^m (t_{pj} - y_{pj}) f'_2(S_j). \quad (14)$$

It can be calculated from the chain theorem that

$$\frac{\partial E_p}{\partial w_{jk}} = \frac{\partial E_p}{\partial S_j} \cdot \frac{\partial S_j}{\partial w_{jk}} = -\delta_{xj} \cdot z_k \quad (15)$$

$$= -\sum_{j=1}^m (t_{pj} - y_{pj}) f'_2(S_j) \cdot z_k.$$

Therefore, the formula for adjusting the weight of each node in the output layer is

$$\Delta w_{jk} = \sum_{p=1}^P \sum_{j=1}^m \eta (t_{pj} - y_{pj}) f'_2(S_j) z_k \quad (16)$$

Finally, it is necessary to request the change of the hidden layer weight as follows:

$$\Delta v_{ki} = -\eta \frac{\partial E}{\partial v_{ki}} = -\eta \frac{\partial}{\partial v_{ki}} \left(\sum_{p=1}^P E_p \right) = \sum_{p=1}^P \left(-\eta \frac{\partial E_p}{\partial v_{ki}} \right). \quad (17)$$

The formula for adjusting the weight of each node in the hidden layer is as follows, which is similar to the method of calculating the weight change of the output layer:

$$\Delta v_{ki} = \sum_{p=1}^P \sum_{j=1}^m \eta (t_{pj} - y_{pj}) f'_2(S_j) w_{jk} f'_1(S_k) x_i. \quad (18)$$

3.3. Speech Recognition. It is a tedious task to directly use the programming language of neural network model to perform simulation-aided design. First of all, compilers are very complex. More importantly, only certain programs can be compiled to solve various specific problems. In this case, MATLAB software package brings a lot of convenience to people, which makes it more and more popular. Because data preprocessing is the premise and foundation of neural network model. Therefore, speech signal preprocessing plays a very important role in the process of speech recognition, the most important of which is the detection and feature extraction of audio signal endpoint. After obtaining the features of the audio signal, we can set up the neural network to match the work with the sample training.

The basic process of dual threshold endpoint detection algorithm is as follows: first, set a lower threshold to make the signal pass through with weak intensity, and then set a higher threshold for the signal whose short-term average energy reaches a certain intensity. If either of the two indicators exceeds the low threshold, the starting position shall be displayed to continuously detect the average energy and zero cross rate of the subsequent frame signals. If the values of the two indicators to be tested are lower than the lower threshold, it can be determined that the effective audio signal has not started and the current display start point has been cancelled, and the two indicators to be tested are higher than the upper limit, which means that the signal begins to belong to a valid voice segment. When the current state is the effective audio interval, the signal of the next frame will continue to be calculated. When the average energy and zero crossing rate return below the low threshold, the end position will be displayed, and the energy and zero crossing rate will be continuously detected in the subsequent frame signal. If the values of both parameters rise and exceed the upper threshold, it can be determined that the valid audio signal has not ended and the currently displayed endpoint has been cancelled. However, if there are not more than two indicators to be tested, the high threshold indicates that the audio signal is in the “start” state. A command can contain multiple characters, so the audio signal will go through the start, end, restart, and end process.

Figure 2 shows the results of a “confirm” instruction sample and a “cancel” instruction sample after double threshold endpoint detection.

The result of dual-threshold endpoint detection after MATLAB work is shown in Figure 3.

The specific relationship between Mel frequency and actual audio frequency is as follows:

$$f_{\text{mel}}(f) = 2595 \cdot \log\left(1 + \frac{f}{700 \text{ Hz}}\right). \quad (19)$$

The functional form of the maximum and minimum methods is as follows:

$$x_k = \frac{(x_k - x_{\min})}{(x_{\max} - x_{\min})}. \quad (20)$$

The functional form of the mean variance method is as follows:

$$x_k = \frac{(x_k - x_{\text{mean}})}{x_{\text{var}}}. \quad (21)$$

The number of unnatural neurons can be calculated by the following equation:

$$\begin{cases} l < n - 1 \\ l < \sqrt{m + n} + a. \\ l = \log_2 n \end{cases} \quad (22)$$

4. The Design and Practical Application of the Online Teaching System for Adult Education of the Internet of Things

4.1. Key Technologies of Online Teaching System. Under the B/S development model, the user interface is realized

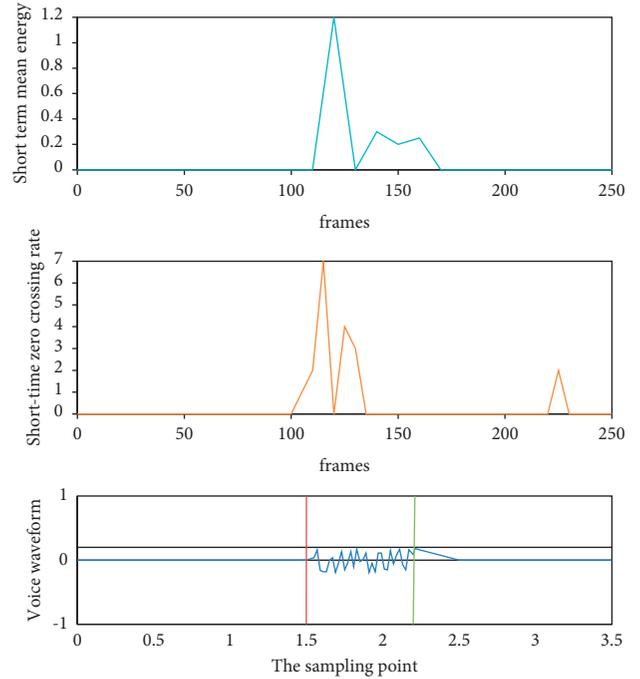


FIGURE 2: A sample “ok” instruction and a sample “cancel” instruction.

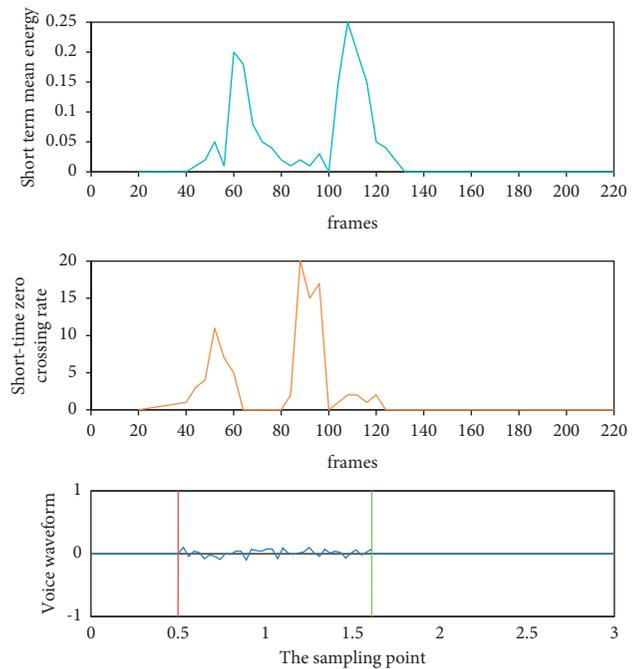


FIGURE 3: The result obtained after the dual-threshold endpoint detection MATLAB operation.

through the browser. The user implementation is only a small part of the three-tier data, which greatly simplifies the load on the client system and reduces system upgrade and maintenance costs. Therefore, we can use the B/S model to effectively manage permissions and protect our data platform and server database.

NET Framework is a widely used development platform that can be used to build applications such as Windows, Windows Server, and Windows Azure. At the top of the .NET Framework, the class library is ADO.NET and XML data, the higher layer of XML is ASP.NET, and the higher layer of Windows Forms is CLS and programming language (VB). Compared with the previous development model, ASP.NET has the following advantages: ASP.NET has a three-tier architecture model, the relationship between the hierarchical structure is independent, only need to make relevant changes to modify and maintain the system, and can be to a certain extent, the readability and scalability of the code are improved, and a lot of resources are saved for subsequent project system upgrades and maintenance, which is convenient for maintenance and management.

The ASP.NET 3-tier architecture is PL, BLL, and DAL. (1) Data access layer (DAL): this layer mainly performs data processing. (2) Business logic layer (BLL): the main task of this level is to combine the data authority level and the presentation level and provide all database-related functions. (3) Presentation layer (PL): located in the outermost layer of the third layer, it provides interactive functions with users. The presentation layer transmits parameters to the intermediate business logic layer to accept the parameters of the business logic layer.

Android is an open source operating system based on the Linux system, which is mainly used in mobile smart phones. For Android, it has the following characteristics: (1) reusable framework and components, (2) optimized for mobile phones, Dalvik virtual machine, (3) kit engine is a mobile browser, (4) embedded database SQLite storage Structured data, (5) the multimedia function library can support multiple formats, (6) we provide GSM mobile phone communication, (7) support Bluetooth communication and 3G and WiFi networks, and (8) have a rich development environment.

Collaborative filtering algorithm is a widely used algorithm, and its main feature is that it is not restricted by the characteristics and content of specific products. However, the collaborative filtering algorithm has the problem of sparse data. The principle of the collaborative filtering algorithm: allows users to recommend relevant interests and pass them to other users. As an information transmission process, recommending users can save time searching for other product information to choose whether to use, and it is recommended that collaborative filtering is a simulation of these processes. Different people usually have similar interests and hobbies, which are usually related to the similarity of growth experience. Therefore, we can make predictions and suggestions based on the similarity of interests. Based on this idea, collaborative filtering recommendation algorithm is applied to commercial recommendation. Collaborative filtering algorithms can be divided into two categories: model-based collaborative filtering algorithms and hybrid collaborative filtering algorithms. The process is shown in Figure 4.

Collaborative filtering algorithm has the advantages of original recommendation and has been studied and applied in various fields. Although collaborative filtering

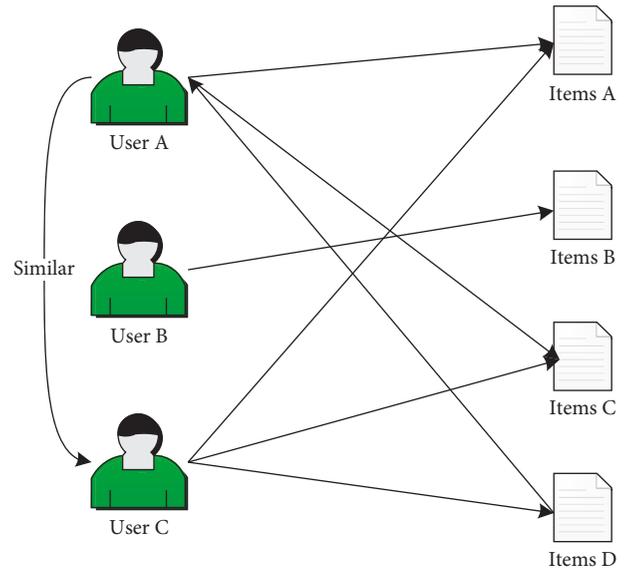


FIGURE 4: Collaborative filtering algorithm based on user similarity.

recommendation algorithm has become the most widely used recommendation algorithm, with the rapid development of Internet and the improvement of site structure complexity, collaborative filtering recommendation algorithm still faces some problems, as shown in Table 1.

As shown in formula (23), it can be explained that the recommendation based on the collaborative filtering algorithm is recommended to the user.

$$\forall c \in C, i'_c = \arg \max_{i \in I} f(c, s), \quad (23)$$

$$P_{u,i} = \frac{\sum_{\text{all similar items}, N} (S_{i,N} * R_{u,N})}{\sum_{\text{all similar items}, N} |S_{i,N}|}. \quad (24)$$

The correlation algorithm is a data mining algorithm suitable for recommended fields. The main idea of the correlation algorithm is to find a strong correlation rule based on the threshold setting, which is used to display the probability of two or more items at the same time. Find the user's general rules and use them to predict the outcome of each choice.

An item set is a collection of items. A group of items containing K items is called a K item group, such as a collection of two items (eg eggs, flour). The item set frequency is the number of all transactions, including the item set obtained by filtering the transaction set. The minimum support refers to the threshold defined by the user to identify whether the support is within a reasonable range. The minimum trust level is a user-defined threshold, used to identify whether the trust level is within a reasonable range and used to define relevance. The rule that has the lowest reliability and satisfies the minimum support threshold and the minimum trust threshold at the same time is called a strong rule.

Frequent item set: a process of looping through all items that meet the minimum support threshold. A group of items that meet these requirements is called a frequent item group.

TABLE 1: Project and user.

| User | Item 1 | Item 2 |
|--------|--------|--------|
| User 1 | 5 | 3 |
| User 2 | 4 | 3 |
| User 3 | 4 | — |

Create rules: carefully check the common things in the above steps to find all reliable rules, and these rules are called powerful rules.

4.2. System Requirement Analysis. Because traditional adult education cannot use intensive education, there are problems such as scattered educational resources, lack of resources in educational institutions, and complex educational administration. The purpose of adult higher education and online education system is to concentrate educational resources, promote student learning, and centralize educational management. Therefore, the system as a whole is divided into four parts: the first part is a comprehensive management system for adult higher education, and the goal is to centrally manage educational resources and the team of teachers and students. The second part is the online education system for adult higher education. The purpose of learning is to solve the problems of the inability to achieve the unity of learning time and learning location and the inability to use intensive education. The third part recommends a personalized course and selection system. The main feature of the system is to provide students with course selection services, and students can create a timetable. The fourth part is the mobile education application for adult higher education, which aims to provide a more convenient learning method and make full use of scattered time and “relieve contradictions.”

System requirements must be considered when designing the system, and the requirements of the system scope should be based on the following characteristics: (1) feasibility and ease of use. The system should be based on actual requirements and easy to operate. (2) Reliability and robustness. The system is fault tolerant and must handle all emergency situations. (3) Scalability and possibility of change, the system should be easy to maintain and upgrade. (4) Security, the system must ensure the security of user information. (5) Completeness, the system needs complete functions.

The role of the system mainly includes the headquarters and the correspondence station, as shown in Table 2.

4.3. System Framework Design. The abovementioned system can help schools to centrally manage educational resources in adult education, while ensuring that “contradictions between work and study” are alleviated and providing convenient learning services for students. At the same time, we designed a mobile learning application to further increase student learning time and maximize the time allocated. APP is software for education platforms. It uses smart phones and an integrated management system based on personalized

recommendations and uses online education systems and courses to select system connections. The main purpose of mobile education APP is to promote student learning, so the function of APP is mainly to provide online learning services. The functions are divided into four directions according to needs. The function settings are mainly used for basic knowledge, student functions, and other functions to facilitate students’ use.

With reference to the actual functional requirements of system development, the system adopts a Web-based B/S structure model and uses development tools. We use a three-tier development model for system design and development. The system is divided into three stages, and this model has the effect of scalability. The specific situation is shown in Figure 5.

The “push” model is a new type of service based on the network environment, that is, information service providers use “push” technology to provide information services for specific users of the Internet. With this technology, network information services can not only directly push information about a specific user to him but also can effectively use idle network resources to obtain the information required by the user in time, thereby improving overall performance and system operating efficiency. Supporting multiple terminals means that we can learn information through multiple receiving channels such as computers, Web terminals, and mobile APP terminals. From a technical point of view, the “push” model is a network information service system with a certain level of intelligence that can automatically provide information services. Its characteristics are as follows.

- (1) Appropriateness: push technology can search, process, and push to users’ specific information needs. For example, when submitting scores, teachers must submit scores in time. If some teachers do not submit scores on time, they will automatically screen those who need to be notified in advance to push the system’s SMS and e-mail notifications.
- (2) High efficiency: the application of push technology is usually started when the network is idle, so that the network bandwidth can be effectively used. For example, the information push notification sent to teachers is usually set at around 7 am, and now most users will find it easier to push information when they are not using the Internet, and send wonderful course content to students. The system has set up multiple push perspectives, before pushing, if the network traffic is lower than the traffic limit. If the push continues to exceed the access limit, content push will be performed, and only a small amount of content will be pushed to the students, such as educational notifications, exchanges and discussion content.
- (3) Flexibility: the “push” mode also allows us to customize the information that needs to be pushed according to user needs. The system contains various information. Usually, the platform will wait after the user publishes the information until it actively enters the platform to open the page, but the user must first

TABLE 2: List of management roles.

| Serial number | Management level | Role | | | | | | | |
|---------------|------------------------|-----------------|-------------------|------------|----------------------|----------------------|------------------------|---------|---------|
| | | College leaders | Leaders in charge | Headmaster | System administrator | School administrator | Teaching administrator | Teacher | Student |
| 1 | College headquarters | √ | ✓ | √ | √ | √ | ✓ | √ | √ |
| 2 | Correspondence station | | ✓ | ✓ | ✓ | ✓ | | ✓ | V |

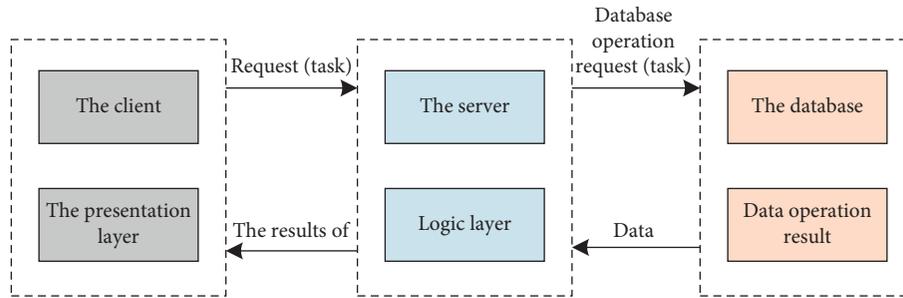


FIGURE 5: System framework design.

enter the platform to receive some important information. With this in mind, the system combines “complete mode” and “push mode” in the development process and designed a general information disclosure module. After successfully logging in to the platform, most users will be able to receive information in a timely manner. Students can confirm information and add important information at the same time, such as the teacher’s class time notification “PUSH push notification” function, through which information is released and pushed, watching time videos, doing homework, and constantly reminding students of test questions.

4.4. System Implementation and Testing. The system grants privileges to users based on their roles, thereby facilitating integrated management of user privileges. Roles are divided into two levels: headquarters and communication station. The system can dynamically add roles and specify the privileges and operating function modules belonging to the user, so as to better realize the flexible and dynamic management of privileges.

The important data tables to realize this function such as communication station information table, user table, role table, role authority table, function module table, and communication station information table mainly contain the important information of the station: station number, communication station number, and name. The user table contains basic user information (user ID, number of users, and basic user identification information). In the role table, the table mainly has three fields: F_jsbm (role code) type is a character string, and F_jsmc (role name) type is a character String and F_jsjb (role level). The display range varies depending on the role level. If it is a supported workstation, you can only view information about the

supported workstation. The department can view the information of all supported sites, but can only change the information of the supported site. The role permission table has two fields: role code and module code. The role of the module code is a specific example of the module table, the function module table is the table of the abovementioned modules, and the role permissions and function permissions are listed in Table 3.

The T_XT_gnmk function module table is as shown in Table 4:

The main function of the network teaching system is to provide test practice and feedback, so background support requires a strong test question bank and flexible test paper technology. When designing the question bank, the system should be adapted to different disciplines. Different question types in the discipline design can be determined by selecting “test question types,” single selections, etc., and distinguish between common question types and special question types. It is common for judging the type of short answer to be displayed in the blank. Basically, the question type is only the explanation of each topic. Special question types can only be displayed in specific fields. Other areas use the stored test question library. The general structure will be automatically applied to other question types. At the same time, they are grouped by the type of question displayed on the interface. Subjective questions appear in independent controls. Taking into account the particularity and diversity of examination questions in each subject, the system uses multimedia to store examination questions, options, answers, attachments, analysis, and so on and plain text as well as video, graphics, audio, video, hyperlinks, and other media elements. The system uses CKEditor (rich text html editor) to simplify the editing and saving of multimedia exam questions.

The core data table involved in the realization of this module function is shown in Table 5.

TABLE 3: T_XT_js_gnmk role authorization form.

| Attribute | Chinese name | Data type and length | Is it empty | Primary/foreign key | Remarks |
|-----------|---------------------|----------------------|-------------|---------------------|---|
| F_jsbm | Role coding | Varchar (2) | N | P | |
| F_mkmbm | Module code | Varchar (10) | N | | |
| F_czqx | Operation authority | Varchar (50) | N | | The content of this field is a subset of the “operation function” in the module table |

TABLE 4: T_XT_gnmk function module table.

| Attribute | Chinese name | Data type and length | Is it empty | Primary/foreign key | Remarks |
|-----------|--------------------|----------------------|-------------|---------------------|--|
| F_mkmbm | Module code | Varchar (10) | N | P | Use codes to identify the menu level, 01 means the first-level menu, 0101 means the second-level menu, 010101 means the third-level menu |
| F_mkmc | Module name | Varchar (50) | N | | |
| Fjdz | Link address | Varchar (100) | N | | |
| F_xssx | Display order | Int | N | | |
| F_czgn. | Operation function | Varchar (50) | | | Operation functions include add, delete, modify, query, etc., separated by |
| F_sjcd | Module level | Int | N | | Divided into 1, 2, 3 levels |

TABLE 5: Question bank.

| Field name | Chinese name | Data-type length | Constraint scope | Can it be empty | Remarks |
|------------|-----------------------------|------------------|------------------|-----------------|---|
| F ID | ID | Int | | N | Self-increasing 1 |
| F_wlkcID | Online course id | Int | | N | |
| F_zjID | Course chapter ID | Int | | N | |
| F_stlxID | Question type id | Char (2) | | N | Related question type table id |
| F_cslbID | Test category | Varchar (20) | | N | Correlation test category table id, can store multiple id, separated by comma |
| F_sttm | Question title | Text | | N | |
| F_stdaan | Answers to test questions | Text | | | |
| F_stfjmc | Accessory name | Nvarchar (100) | | | |
| F_stfjdz | Question attachment address | Varchar (100) | | | |
| F_daanjx | Answer analysis | Text | | | |

5. Conclusion

This article details the development and key technologies of the adult education network online education platform and the status quo of adult higher education. It can be understood that online education is a way to solve the problems faced by adult higher education. Analyze the problem of information overload and point out that adult higher education requires individual course recommendations. In this article, we first analyze the functional requirements of the online education platform for adult higher education and design four systems: (1) an adult higher education comprehensive management system used to manage the education of students and teachers; (2) used to manage education and learning the online education system for adult higher education services; (3) the student course selection system based on personalized course

recommendation provides students with personalized course preparations to realize the personalized development of adult education; and (4) mobile education applications are used for providing students with more convenient learning conditions. According to the demand analysis, we will design a network learning model based on the “push” mode and the basic functions of multiple terminals and the above four systems. Second, we will recommend related algorithms for existing courses and analyze the shortcomings of these algorithms. Then, according to relevant algorithms and collaborative filtering ideas, use course selection and scoring to design and recommend relevant algorithms for personalized courses. Taking into account the double standards of scores, the algorithm can choose a course to meet the real-time requirements of the recommendation algorithm and finally realize the functions of the designed system.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The author declares that she has no conflicts of interest.

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