

Intelligent Online English Testing System Based on B / S Structure

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Abstract

Nowadays, English learners usually have gained a big vocabulary, but they always review it inadequately. This paper proposes an online intelligent English testing system based on B/S structure. We have completed the design of system structure, realized the testing function on the basis of this online smart English testing system. This paper shows that how the scheme works and there is a high practical value.

Keywords

Online English Test; Query Results; Paper Management; User Management

Introduction

Testing is an important part of the education, which not only has the function of learning assessments, but also provides strong feedbacks and guidance with its outcomes. That means testing is an important means of self-test for teachers' teaching effectiveness and students' self-evaluation. The traditional test has the defect of the long existing cycle, low efficiency, inconvenience for checking, poor question banks etc. Online testing systems on the basis of modern computer and network technology have come into being in such a social demands and realistic backgrounds.

This paper creatively presents a creative intelligent reviewing platform, which uses the Euclidean distance algorithm to provide personalized online review services for each student. Previous online examination system treated all students equally, but the students' situations are different. This paper proposes that intelligent reviews, with situational platforms, should be tailored for each student to review the content, and effectively improve the students' efficiency of reviewing. The student plays a significant role in promoting his or her progress.

Based on B/S architecture system design

System Architecture

This system uses the B/S (Browser/Server) architecture, which consists of browser, the database server and Web application server. Along with the developments of computer network technology, this structure is a variation or improvement to the C/S structure. In this structure, the client can install a browser, such as Chrome or Internet Explorer, and the server should install Oracle, Sybase, or SQL Server database. The browser data interacts with the database through the Web Server.

The advantage of the system based on B/S architecture is clients' limit free. Users only need to use the browser to login in the server through the Internet, then execute online English exams or manage the system. (System framework as shown in Figure 2-1.)

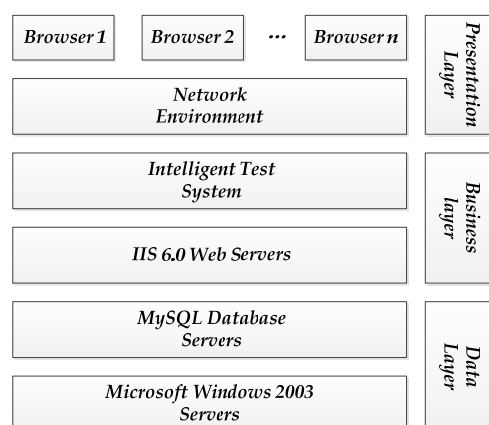


FIGURE 2-1 SYSTEM FRAMEWORK

System Database Design

Database is the foundation of the online English testing system. In order to realize various functions of the system, the database design should be determined firstly. We need to establish the corresponding data table, in the database of online English testing system

based on B/S structure, including the user table (to store the basic information of the individual users), function table (to match user permissions and functions), module tables (to store system partition module information), function table (to store the functions of every module), paper table (to include test paper information), question table (to store the specific information of a paper), test question table (match the test paper with the corresponding questions), result table (to store students' achievement information). (The relation diagram of the system database as shown in figure 2-3.)

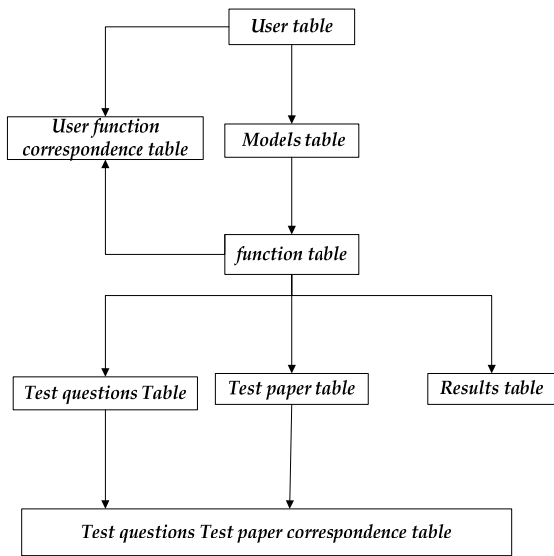


FIGURE 2-3 THE RELATIONSHIP OF THE TWO DATABASES

In the database, all the many-to-many connections are simplified to one-to-many relations. So the database contains only the one-to-one and one-to-many links, such as a user ID and a paper ID for one-to-many link or one-to-many link of a user ID and a paper ID, one-to-one contact of a user ID and a user name.

System implementation

Architecture of System

From the functional point of view, online English testing system includes online test, checking, post-examination questions, intelligence review, communications and query results, user management, paper management, and performance management. Each function is realized by Web Services and Data Services, combining with ThinkPHP technology. (System functions as shown in figure 3-1.)

The data flow of the online English testing system is shown in figure 3-2. It defines two entities, namely the consumer and the external data. In the data flow diagram, the external data refers to the various input

data outside the system. In addition, it defines administrators, teachers and students, who use different functions in the system in turn according to their levels of permissions.

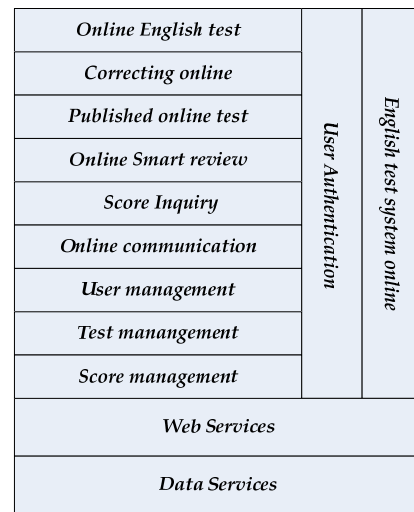


FIGURE 3-1 SYSTEM FUNCTIONS

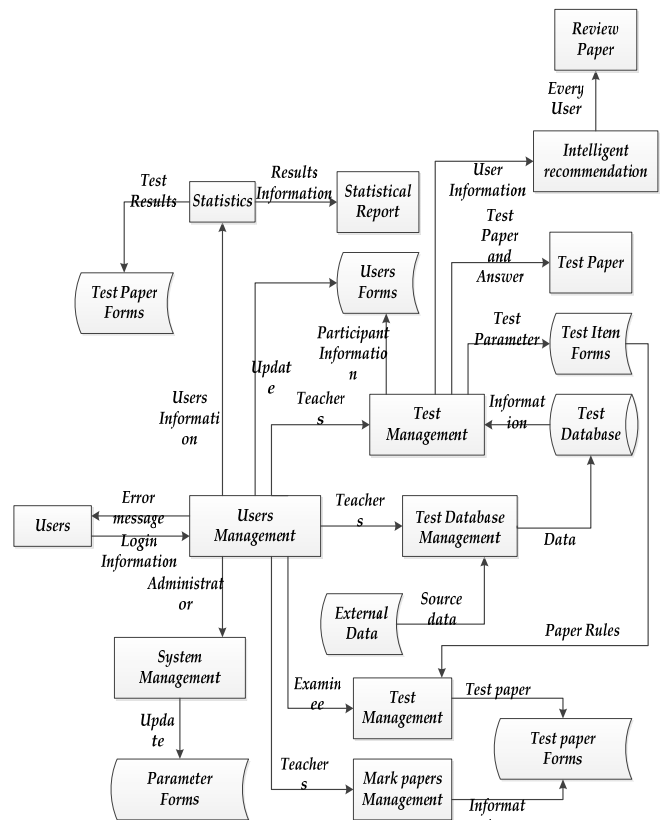


FIGURE 3-2 THE DATA FLOW OF ONLINE ENGLISH TESTING SYSTEM

Intelligent Review Module

The Platform for Intelligent Review Based On Euclidean Distance

The module service for intelligent review of this system is running in a dynamic environment,

according to the different situations of each student. It can provide students with online review services conforming to their own needs. An intelligent review module based on the Euclidean distance is proposed in this paper to improve the accuracy of review service, quality of service and the effectiveness of different students to consolidate reviewing.

When the system provides students with online review service, it has a candidate set of review questions complied with the needs of different students by the Euclidean distance matching. Candidate set is set to m -dimensional vector $D=(d_1, d_2, \dots, d_m)$, d_i (in $[1, m]$) d_i indicates English question types, for example d_1 indicates reading comprehension, d_2 indicates writing, d_3 indicates hearing, etc. Assuming that each set of review questions with n key assessment indicators $Q=(q_1, q_2, \dots, q_n)$, in which q_1 indicates the degree of difficulty, q_2 indicates question value, q_3 indicates level of understanding, q_4 indicates quality of service attribute etc. An n key assessment indicators of m constitutes reviewing questions with a set decision matrix $D_{m \times n}$, and different questions recommend services for each student, which determines the effect of the consolidation and quality of service of review system for each student.

In general, the importance of several key assessment indicators of the entire system is not equal, some assessment indicators have greater impact on the overall performance of the service, and some have a smaller impact on the overall performance of the service. To indicate the importance of each indicator, the system sets the weight w_i of attribute q_i in the matrix D , each evaluation indicator w_i constitutes the weight vector w , the specific value can be determined by the system itself.

We have set n key assessment indicators with specific quantitative values for each question, for example, we require that the quantization value of question value is 0.7. Each dimension that reaches the value of 0.7 indicates students solve the questions with a relatively good result. If it is less than 0.7, the system needs to provide the same type of questions for the students to carry out the review and consolidations.

Then, an n -dimensional vector set for every student is assigned, and each dimension indicates the same set of assessment indicators for each review question, and its value can be quantified by the student's score and the QoS requirements of students in the system. After the

completion of these two steps above, we use the Euclidean distance method to calculate the distance between every student's assessment based on the standards for each question and the system default. The greater distance indicates the questions that students have been not accurate enough, the system needs to provide a similar type and satisfies the QoS requested questions to the students to review and consolidate.

Euclidean distance is usually measured by the similarity of two vectors, when the corresponding component of the two vectors is equal, their Euclidean distance is zero. Among them, the system uses the weighted Euclidean distance which is calculated by the following formula:

$$d(Q, T) = \|Q - T\| = \sqrt{w_1(q_1 - t_1)^2 + w_2(q_2 - t_2)^2 + \dots + w_n(q_n - t_n)^2}$$

In summary, the intelligent review of this online English testing system is based on the similarity between preset standard English questions and students' assessments. With the indicators to measure students' mastery for each question, we use Euclidean distance to calculate their similarity. The smaller the Euclidean distance indicates higher similarity, which means that the higher the students' mastery of this type of question is, the higher QoS satisfaction it provides. Students test through this online English testing system, and the system calculates Euclidean distance between the standards and students' assessment indicator, sort the results according to the Euclidean distance, provide the questions with the biggest distance to students in order to improve effectiveness of reviewing and system QoS.

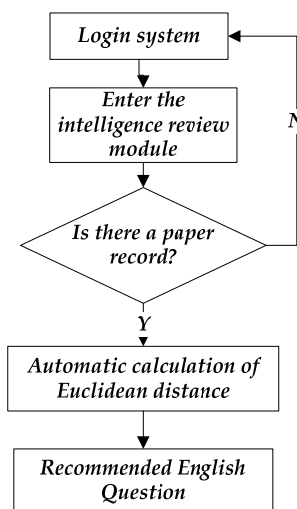


FIGURE 3-3 FLOWCHART OF INTELLIGENT REVIEW

The Implementation of Intelligent Review

Students successfully enter into the interface of this online English testing system, then enter the intelligent review module through the review interface. The system will automatically get the most suitable database to the students with meeting the needs of online review service, according to the different circumstances of each student in the background and Euclidean distance algorithm.

The flowchart of Intelligent review process as shown in Figure 3-3.

System Testing

We need to test this system, after it is coded and realized. Software testing is an important stage in the process of software development.

Test Configuration

Database configuration: in various parts of the function module, the successful connection to the database is the foundation of their normal work. So the connection of each module and the database is essential. Therefore, each module of the system uses a unified database configuration file.

Server Configuration: the server hardware configuration includes: a Web server, a database server. Web server using IIS7.0 , database using MySQL5.0. The operating system uses Windows 2003 Server.

Client Configuration: This operating system uses Windows XP or above, CPU frequency 1G Hz or above, 512M RAM or above and the browser IE6.0 or above.

Network Configuration: The Ethernet connection between the client and the Web, network communication protocols: TCP/IP, network transport protocols: HTTP.

The Test Results

In order to increase the reliability and validity of the online English testing system, we construct an evaluation of the online English testing system. And the results of this evaluation are as shown in Table4-2.


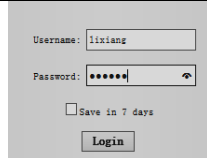
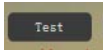

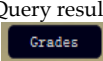

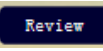

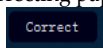
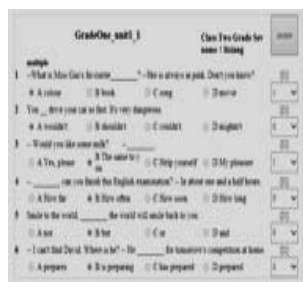
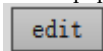

The test table from left to right is the test number, the test description, the test interface, and the test results .

Testing tasks can be divided into three groups. The first group includes the Test 1-4, which simulates the routine operations of students, such as logging the

system, testing English online, querying grades, reviewing intelligent, modifying personal information and other operations. The third group is the Test 5-6, which simulates teachers how to mark the papers in the system online, publish papers online and other operations.

Through the above test cases, we can see that the online English testing system operates normally, which meets the design goals.

TABLE4-2 SYSTEM TESTING TABLE

No.	Test Description Test Interface	Test Results
1	User Login 	
2	Start exam 	
3	Query results 	
4	Online Review 	
5	Correcting papers 	
6	Published papers 	

Conclusions

With the advancement of science and technology,

online exam, as an important direction of modern education development, has been widely supported by a majority of teachers and students. Online testing system based on B / S architecture begins to flourish. Our system, which is shown in this paper, is new and practical, interface-friendly, convenient and safe. After a period of testing and adjustment, the basic functions of the system can meet the design requirements, and it has a high practical significance. However, due to the time limitations, online English test platform still has some deficiencies, such as the system should also be improved in the aspect of querying results, management of test papers to make online English testing system more perfect.

ACKNOWLEDGMENT

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