

Design and Application of Computer-aided English Online Examination System

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Abstract. With the popularization of computer, computer-aided examination has become the hot topic of studies. In English teaching and testing, using the computer-aided test system to test the English ability of students has been a trend. In this paper, computer-aided English exam system both at home and abroad are studied, some problems in the field test part are concluded. To solve these problems that can be improved, the author put forward technical solutions for field examination system of computer-aided English test development to realize topic diversification and cross-platform characteristics.

Introduction of related technology

The development of the computer professional English online examination system mainly involves the following related techniques.

ASP.NET technology

ASP.NET is a new type of architecture in the development of Microsoft .NET system. Part of the unity is based on the common language of program frame, can run in WEB application development platform and build strong ASP.NET WEB application with ASP.NET WEB services. Code to write ASP.NET application can be any language compatible with common language run-time (CLR), including C#, Visual Basic, JScript.NET, etc.

ASP.NET applications can be used on all .NET framework and provide developers a variety of run-time environment services. ASP.NET lets developers play advantage of these technologies, including the common language run-time, data access, language inheritance, error handling, etc., developers can write cleaner code structure, at the same time, the code can be used multiple times and sharing.

ASP.NET can work together seamlessly with visualization HTML editor and other programming tools, facilitate developers make the fullest use of these tools provided by the advantages. For example, Microsoft Visual Studio.NET programming tool, it provides graphical IDE (integrated development environment) to create the application. [1] In this way, some developers have desktop development experience will be very easy to use, thus realize a smooth transition to the development of ASP.NET.

Database technology

SQL Server is a relational database system Microsoft launched. As a service operation, the SQL server component runs in a Windows service manner. SQL Server provides the core support for the XML (extensible markup language), and on the basis of Web standards database programming function, provides the user connections, query request service and the function of data security.

SQL Server has the following features:

(1) Good compatibility: because the SQL Server uses the same code base, even if the application environment difference is different, it can still ensure compatibility between different application environment databases.

(2) Powerful stored procedure: the stored procedure is to store pre-compiled on the server, which procedures can be invoked in the background or the foreground. [2] Use stored procedures can reduce network traffic and make the function modules are shared by users so as to speed up the

development efficiency. First execute the stored procedure will create query tree in buffer, do not need to redo the precompiled when executed later, which accelerated the speed. By grant users access to the stored procedure to avoid users direct access storage used in the process of data table can guarantee the security of the data in the table.

(3) Database function: SQL Server relational database engine can support the functionality required by the data processing environment. The database engine protects the integrity of the data. Distributed query can refer to different sources of data, and protect the integrity of the distributed data updating.

ADO database access technology

ADO.NET is subsequent technology of Microsoft ActiveX (ADO), which is the standard of service for the ASP.NET and Windows Forms applications access to a variety of data (such as an RDBMS and XML document). It is based on developer feedback, after many modification and development of data access library. ADO.NET provides the consistency for Microsoft SQL Server data source and XML through OLEDB and public data sources. [3]Data user applications can use ADO.NET to connect to the data source, retrieve, and update the operation number. ADO.NET supports a variety of development requirements, such as front-end customer database, and the middle of the Internet browser for business object, etc.

Computer-aided Language Learning system provides a good Learning environment for the student's oral practice , it can effectively guide the correct pronunciation of students and train and improve students' oral English ability.

Student's speech rate is mainly from the accuracy of speech, of the fast speed, stress testing, etc. Current rating method using hidden Markov model (HMM) automatic speech recognition technology. Select phonemes as recognition unit in the phonemes associated Viterbi decoding, sound source is used as a measure, and the more similar the higher ratings are. There was a positive correlation between similarity and the size of phoneme pronunciation, intonation, clear, etc. Assuming that the i th phoneme of phonemes q , T_i for beginning corresponding to the period of time. T moment of the observed characteristic vector for O_t , corresponding HMM status to S_t , the HMM likelihood score is based on:

$$M_i = \sum_{t=\tau_i}^{\tau_{i+1}-1} \lg[P(S_t|S_{t-1})P(O_t|S_t)]$$

The core of ADO.NET components include:

Connections: at ADO.NET bottom, open Connections between the program and database.

Commands: send some instructions to the database. Such as query, add, modify, delete, and call persisting program exists in the database, etc.

Data Readers: read flow data step by step down directly, the Data is read-only, and does not allow for other operations.

Date Set and Date Set Commands: processing image data. Date Set is a memory-resident data forms, which represents a set of data and operate data through Date Set Commands.

Computer-aided test system section settings

The exam answer system is a very important part in computer aided test system, on which students realize answer the questions on the communication system. Whether the design is reasonable and human or not will definitely affect the final scores. A humanization, simple reasonable exam answer system can let students feel free for test operation, thus reduce the tension of the examinee exam, promotes students to develop their own potential, and get a good result. Only by cooperating with other systems, can exam answer system play its role. The supervise system of examination system will exhibit test questions according to the order on the screen. [4]When the invigilation system send out a certain command, exam answer system would react accordingly to process text, images, audio, video, etc. So exam answer system can be divided into three parts, as shown in figure 1 and figure 2.

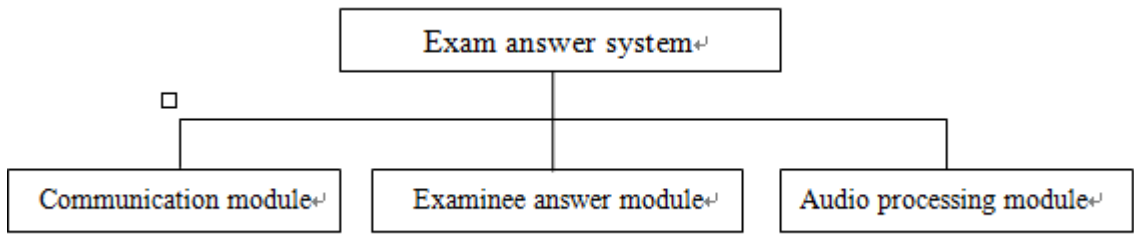


Figure 1 Functional modules of the exam answer system

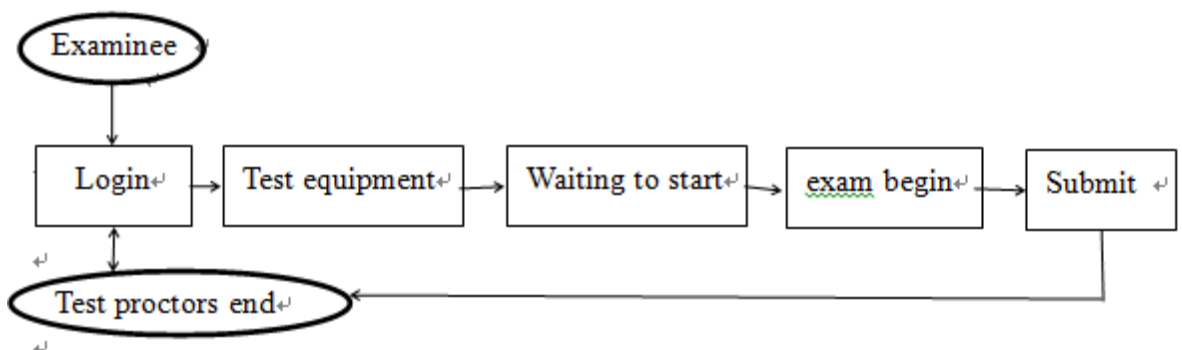


Figure2 Exam answer process

Adaptive testing and roll system

Computer adaptive test

1) Overview

In traditional test, all the examiners of all levels are to accept the same subject test, which means for the students of low level will be frustrated by the difficult topic while for the students of high level, it couldn't test the examiners real level out with this paper, wasting energy in vain. Theoretical analysis and practical experience has proved that the subject difficulty levels corresponding with students' level, information provided is of the largest amount and the test validity is the best.

Computer adaptive test (CAT) takes item response theory as the theoretical basis. It is a kind of new test methods and means developed according to the characteristics of the computer in the 80s. Adaptability test implement different test item according to the different levels of each of the subjects, and the difficulty of the project adapt themselves to the level of the subjects. According to the test theory, adapt the test questions according to the levels of the project participants. If the project difficulty makes the rate around 0.5, then the project for the test precision of subjects is the largest. Because using item response theory requires considerable computational power for value determination of subjects' abilities, the adaptive test adopt fixed branch of early test. With the wide popularity of the computer and the rapid increase of computing power, modern adaptability test used more flexible branches to the present project participants. [5]Adopt flexible branch testing can maximize the use of computer computing power to achieve the purpose of providing test precision. Since the project of computer to students is compatible with the level of the students, , only about 30% 50% of the test items are needed to achieve the same test precision as the traditional test. In conclusion, computer adaptive test has many inherent advantages.

2) Overall process of computer adaptive test

At the beginning of the test, the system know nothing of subjects of latent trait generally, so the usual approach is to choose medium difficulty of test questions, which assumes that all examinee's ability as the medium in the course of random difficulty for medium topic as the starting point of the test. Then, every time after answer the question, the system will estimate and correct the original ability according to the student's ability, and then pick up the question from the item bank, which process can reach the specified level.

Online automatic scoring

1) Related research of automatic scoring

Use of technical means to evaluate students' learning has been one of the important content of education technology research. The Computer Assisted Assessment (CAA) refers to the Computer application in the process of the teaching evaluation; it makes profound changes on the form of evaluation content and method. Firstly, exam content is no longer restricted to dimensions of knowledge, skill examination. Secondly, automatic marking becomes the focus of research. Using the database, which is formed by the CAA can automatically generate various kinds of statistical analysis report, or evacuate rules, patterns and trends at a higher level, it certainly helps to education evaluation of quantitative research. But the CAA researches at home and abroad are mainly concentrated in two aspects of objectivity and adaptive testing, relevant theory, methods and techniques has been relatively mature, entered the stage of practical application system. But test automation research field is in its infancy both at home and abroad, at present can only solve the problem of automatic marking of objective questions. Therefore, now some so-called paperless examination system is of simple topic. Although some automatic system can also be carried out on the part of the actual operation assessment, but only limited to the part of the course content, the lack of skill evaluation automation general theory research, to realize the automation of skills assessment key technology is also no breakthrough. There is no doubt that the skills assessment automation has become a new field of CAA. On the other hand, it is a prominent problem that computer elementary education reform is restricted by the skill examination questions. As well known that practice is the first attribute of basic computer education, computer information technology (IT) skills training is the main teaching goal, teaching evaluation is focused on skills of master and the solution actual problem ability. But the current computer application course exam only rely on the written test to complete, pen and paper to take an examination of phenomenon still exist a lot of experiments and operation skills, this is obviously not conducive to the cultivation of innovation spirit and practice ability, is inconsistent with the requirements of quality education. To fundamentally solve the above problems, we must to test automation theory, methods and techniques for system in-depth research and bold innovation.

2) Basic idea of the automatic scoring

Computer based examination questions include single topic selection, choice, and gap filling. The former three kinds of topic of computer automatic marking is easy to implement, so the key to online examination of automatic marking is to solve the gap filling questions.

The basic idea of gap-filling questions is to examine answer each character with the corresponding standard answers each character by comparison, score according to the right and wrong. Marking software first take out fills up the topic all characters in the standard answer, then the standard answer key characters and the secondary string, and then put into the key character position of the standard answer to the array, at the same time, the location of all minor string into an array, and key characters fu points to 50%, and the second string in accordance with the accounting for the proportion of the whole string gives corresponding points, the other is the removal of the examinee should each part of the string. One out of the individual parts of the examinee answer string, seeks the match to the standard answer, find the string that is correct, and give the corresponding scale scores, all characters after a match you can get the key character match no secondary string matching rate, was not found, the corresponding string did not match the strings and the standard answer number, etc., with these data can according to the given formula to calculate the topic every, and unified score is given.

Summary

In this paper, research and analysis about the existing computer assisted English examination system and its field test subsystem has been carried out. It was found that there exist some problems in the existing examination system that can be improved. Support for the exam in number needs to be improved. Most systems can't very well solve network interruption problems appeared in the process of examination and system cross-platform performance is bad, which need to be improved.

Through research and analysis of these problems, this paper puts forward solutions. Based on the design and implementation of on-site examination system, computer aided English test system was put forward.

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