Research on Technical Optimization of Computer Skills Examination Based on Genetic Algorithms

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Abstract: It is difficult to objectively evaluate the application ability of computer in the traditional form of question-and-answer, and it is undoubtedly the best choice to take the way of computer actual operation to assess. Based on the background of the automatic examination system and the comprehensive analysis of the situation at home and abroad, this paper studies the automated evaluation technology used in the system, and discusses the design and implementation of the automated examination for computer skill teaching from the aspects of system architecture, database design, computer proposition, test paper formation, examination and automated test paper design. The genetic algorithm is used to compose the volume. At the same time, different scoring techniques are adopted according to different types of questions, and the online test platform for computer skills courses is designed and implemented. The algorithm can be successfully applied to automatic test papers, with fast set-up speed and high success rate, and the algorithm is not sensitive to initial values.

1. Introduction

With the rapid development of Internet technology and the implementation of the strategy of rejuvenating the country through science and education and the deepening of the educational reform situation, the educational reform has been continuously developing in depth. The traditional pattern of state-sponsored education has been broken, and various modes of running schools have emerged, showing strong vitality and bright prospects. Online education is an example [1]. At the same time, with the continuous expansion of the examination scale, in the face of thousands of papers, if the traditional manual marking method is used, it will not only take time and effort, but also inefficient. Therefore, automatic marking is an important part of the large-scale computer basic skills assessment system, but also an inevitable choice. This requires the server to have high reliability and absolute data security, and the disk is one of the devices involved in these problems [2]. The emergence of disk array technology is to narrow the gap between increasing CPU speed and disk storage speed. Distance education based on computer network technology, communication technology and multimedia technology has become an inseparable part of traditional education [3]. The emergence of various online schools on the Internet and the trials of network colleges and distance education colleges in many universities in China indicate that online education is developing vigorously and orderly.

At present, the examination systems adopted by various institutions of higher learning are broadly divided into two categories: one is a highly versatile examination system, which is not well-suited for a course; the other is an examination for a course. System, this kind of examination system can well organize the examination of a course, but if each course uses a separate examination system, it will inevitably result in waste of resources [4-5]. Objective questions are easier to implement in a computer test system. Technical means are also diverse. The key technology is how to determine the test points of computer application software skills. Answer acquisition, real-time marking and performance. This requires the establishment of a good computer application ability examination system, not only to achieve the scientific and effective management of computer examination, but also to truly assess the computer knowledge and practical ability of the staff of the organs, enterprises and institutions [6]. On this basis, an improved genetic algorithm is proposed; the improved genetic algorithm is simulated and tested to verify the optimization

performance of the algorithm; the constraints of generating test papers are analyzed in detail, the mathematical model of generating test papers is established according to the theory of educational measurement, and the improved genetic algorithm is applied to generating test papers [7].

2. Methodology

The system simulates the real application software environment. Candidates operate in this virtual environment. The system intercepts the settings and operations of candidates, compares them with the standard answers, evaluates the papers, scores and gives the results. Its advantage is that the system is transparent to the simulated environment [8]. There is no data redundancy in the storage space striping. It has the characteristics of low cost, high reading and writing performance, high utilization of storage space. It is suitable for special applications such as audio and video signal storage, temporary file dump and so on, which require extremely strict speed requirements. Programming is an activity that requires a lot of tricks and rules, especially when dealing with resources such as files, memory, screen space, network connections, databases, etc [9-10]. In the middle of this, the most common bug is the abnormal behavior caused by forgetting to release certain resources. For this reason, the CLR will automatically track the use of resources for us to ensure that the application does not leak resources. Therefore, the online test platform designed in this paper adopts a browser/server structure and adopts MVC layered design.

The system management module is installed on a dedicated computer of the administrator to generate the test paper. Install the generated exam papers and exam system on the test computer. At this time, usually use a floppy disk to store the test system and related exam papers. The candidate's answer sheet is stored in the floppy disk. After the candidate has finished the test, the floppy disk is retrieved, and then the administrator's special computer is used to change the volume. It is also assumed that the error score is independent of the true score and is normally distributed over multiple iterations. On the basis of this theoretical model, a set of theories and methods about test reliability, validity and item discrimination are put forward. For example, it is the application of classical test theory to define the difficulty by test pass rate, and to represent the degree of discrimination by topic score and total score. The result files of the examinee examination papers are analyzed and compared with the standard answers. On the premise that the output format of the application software result file is accurate, this method has high comparability, and thus achieves a higher accuracy of marking papers. For the sake of security, this redundancy only uses half of the disk capacity and wastes a lot of data space. Thus, genetic algorithm and random algorithm are used to test the time required to generate test papers to meet the requirements of the test paper. The results are shown in Table 1 and Figure 1.

Table 1 Comparison of genetic algorithm and random algorithm group time

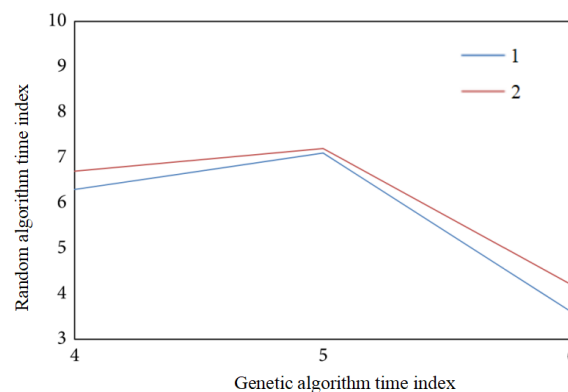| Test number	Genetic algorithm time / s	Random algorithm time /s
1	4	34
2	6	28

Fig.1. Comparison of genetic algorithm and random algorithm group time

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Due to the geographical limitation of the local area network, some test data transmission involving a wide geographical area has become a more prominent problem. At this time, an test server can be used to establish a connection with a local server through a communication line in a different place, and the relevant question database data can be downloaded. Go to the local server, and then organize the exam through the local server. After the exam is completed, pass the exam information back to the server. Classes in the .NET Framework can be used in all NET applications, and the way to connect to these NET Framework classes is through name spaces. Names for NET framework class name spaces have a hierarchical structure. The application can refer to the NET framework class by following the naming convention of the two-part indicating type. Teachers are responsible for the maintenance of the curriculum chapters, topic types and test questions. With the authorization of the system administrator, some teachers can have dual identities as both teachers and test decision-makers. In the future function expansion, we plan to transfer it to project reflection theory, and establish a model of combining adaptive examination system with traditional examination system, so as to achieve better results.

3. Result Analysis and Discussion

Considering the lightweight of the examinee examination system, we migrate the technical realization and complexity difficulties to the question-asking subsystem, and form a standardized answer in the question-asking subsystem in the form of attribute equal to value. This strategy improves the efficiency of the examination system, reduces the storage space and network traffic, and improves the accuracy of evaluation. The array has its own RAID control processing chip, I/O processing chip, and even array cache. It is a complete system. All the required functions can be done. So the function and performance of hard array are better than that of soft array. Since the answer provided by the objective question is unique, the objective question mark is scanned by the pattern matching method, and the candidate's answer and the standard answer provided in the test paper are judged by the matching operation of the string to determine whether it is correct, thereby calculating the candidate. The score situation. Managed by computer, randomly select test questions automatically, the candidates' current operation questions are downloaded to the local area, automatically scored after completion, and stored in the server through the network; the test interface is simple, the examination work is minimized, and the system maintenance is convenient. The idea also uses a retrospective method, which is to retrospectively apply the answer to the candidate test paper and perform matching processing. The same is true, otherwise it is wrong. Figure 2 is a flow chart of the marking process.
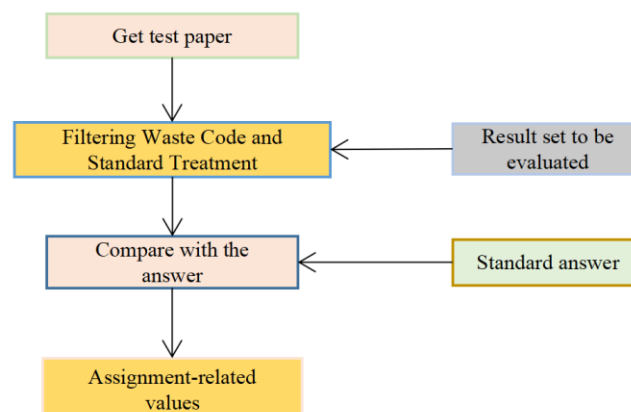

Fig.2. Marking flow chart

With the application and development of computers in the field of education and teaching, the compilation and application of test questions library has become more and more important. The automatic test paper is a difficult point in the development of test questions. How to choose the match in the huge test question bank The required test questions refer to the average difficulty of the test paper, the assignment of test questions, and the difficulty of each question in the test paper.

According to the requirements of the computer environment test center and the configuration of the existing server, it is more suitable to select the RAID 0+1 working mode, which not only realizes real-time data backup, but also greatly ensures data security. According to the computer knowledge coverage of the examinations at all levels, we should set the conditions for selecting the questions, then set the time schedule of the examinations, and set the examination venue according to the time of the examinations. Finally, the examinees make an appointment for the examination according to the schedule of the examination. In addition, the relative security of B/S system is also low. For the server, the data can be filtered through firewall software, because all the transmission content is based on HTTP port, but it is difficult to encrypt and sign the data to ensure the integrity of the transmission process.

Semi-automatic marking is used for subjective questions. Because the answers of subjective questions in computer skills courses are not fixed (some are programs, some are examples), it is difficult to score subjective questions through complete automatic marking. This platform requires teachers to give the scoring rules of the question and the percentage of each rule in the score of the question when they enter the question. How to ensure that the generated papers can meet the different needs of users to the greatest extent, and have randomness, scientificity and rationality is a difficult point in the realization. Especially in the interactive environment, users have higher requirements on the speed of the test paper. The questions should be diverse, random and not easy to cheat. Therefore, choosing an efficient, scientific and reasonable test paper is the key to automatic test papers. The candidate exam plays a very important role. After the exam is over, the teacher will recall the questions that the student has already done, and then give the scores for each step by means of the scoring rules listed in the examination system. Finally, the system automatically calculates the scores to complete the scoring.

4. Conclusions

The domestic web-based network teaching is in the stage of vigorous development, and an online platform that can well support teachers' teaching and student learning is urgently needed. At present, in the field of education, a new research field, computer-assisted instruction, that combines computer science and technology with educational theory and teaching methods has been formed. In the development process of the test bank management, the exhaustive test method is used to test the execution status and scoring points of each operation question to ensure that each question can correctly realize the assessment function. Secondly, the software integration test is carried out. Its main purpose is to check whether the interface between the software components is correct. According to the pre-determined bottom-up integration testing strategy, small software units are combined into larger and larger systems while running the system to analyze the running status of the integrated system. RAID technology is the foundation to solve data security. It is very important to configure RAID working mode properly and give full play to the best performance of server for examination network and informatization.

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