

# Research on Intelligent Standardized English Test Systems with Artificial Intelligence

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**ABSTRACT:** *With the advent of the Internet era, computer technology has penetrated into the political, economic, cultural and other fields, which also includes the field of education. In the traditional education mode, large test is often faced with many difficult including high cost of examination, heavy examinations and so on. Therefore, it is an important research on designing a test system combine with Artificial Intelligence. This paper analyzes the related Artificial Intelligent standardized test system, and uses the improved Genetic Algorithm to refine the rules for an Intelligent test paper, and uses Fuzzy and Close matching to intelligent mark, combines with Artificial Intelligence to design optimized standardized English test systems. And does feasibility analysis and related comparisons by the experiment. The results showed that the Intelligent standardized test system not only ensured the fairness of the examination, reduced the costs of the examination, but also assessed the capacity of the candidates more effectively.*

**Keywords:** Artificial intelligence, Test system, Genetic algorithm

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## 1. Introduction

Under the background of the rapid development of information technology, more and more people realize the importance of computer technology in human society. Popularization and development of computer technology, so that the human society digital, intelligent era of digital intelligence and build a new world, it is a different kind of society, giving people more creative and imaginative. Computer platform as a new carrier, had been constantly penetrated into all walks of life.

Among them, the field of education is also facing the challenge of digital and intelligent. The rational and efficient combination of information technology and education system up, based on the examination of the network takes full advantage of the vast network of infinite space, anytime, anywhere the student's exam, reducing test costs, simplify the burdensome examination affairs, is the traditional exam an extension and change [1]. Computer automatic marking, then the results of the database statistics, sorting, summary. Paper produced by the system randomly selected from the exam, thus effectively avoiding cheating on exams and papers leaks and other problems from occurring, protect the examination fairness and security (See figure 1 and 2).

The second part of this paper analyzes the importance and far-reaching implications of artificial intelligence in the intelligent standardized English test systems. The third part of the optimization design of a standardized English test system includes Intelligent test paper based on fuzzy genetic algorithms and intelligent matching close marking. The fourth part of the improved Intelligent examination system feasibility analysis. The fifth part summarizes concluded.



Figure 1. English test system login interface (Chinese version)



Figure 2. English online test system (Chinese version)

## 2. State of the Art

### 2.1 Exam mode

AI education mode of change had a profound impact, particularly in the application of the examination system. In the intelligent network test system based on the system, there are two different test patterns, which are stand-alone mode and network mode [2].

It refers to the stand-alone mode on a single exam. One is to test the system is installed on a single machine, each machine involved in the test must be installed, it has the advantage to ensure the integrity of the system. The other is installed on the administrator's computer system, it has the advantage of flexible organization examination, no separate administrator training [3]. However, this model has a heavy workload, difficult recovery performance, poor security shortcomings.

Network mode refers to the examination through the Internet. Including B / S (Browser / Server) and C / S (Client / Server) mode. C / S mode and test related software and data server installed on the server, the client software is installed on the client, the candidates through the client on the server get questions from the exam, the candidate data stored on the server. C / S mode, the client has a complete application that can provide an error message and online help function, you can switch freely between subprograms; in addition, C / S mode provides a more secure access mode. The B / S model is based on WEB technology, simplifies the client, the C / S mode server decomposed into a data server and one or more application servers, client-server system constitutes three-layer structure. B / S structure model is multipoint, multipoint, using the TCP protocol, relying on the database server data to ensure their safety [4]. Figure 3 is an English Intelligent Test System.

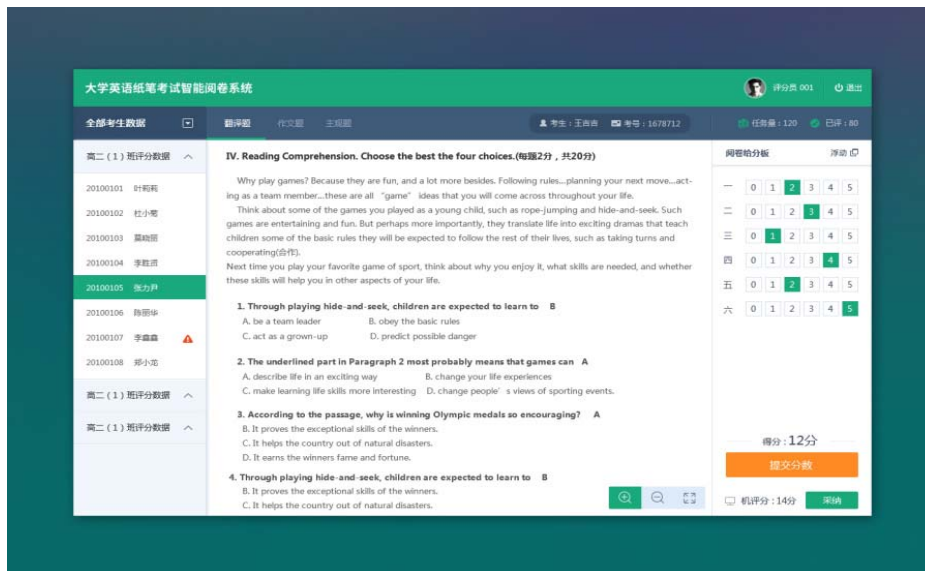


Figure 3. English Intelligent Test System (Chinese version)

### 2.2 Related Technologies of Intelligent Test System

There are many test system implementation is too simple, the lack of effective management tools, the examination cannot be unified management and cannot be integrated into the network teaching platform, and a single type of questions, subjective questions enough support, far unable to meet Intelligent replace traditional exams written request [5]. Thus, on these issues, standardized test system provides the following two methods, making intelligent examination system more complete.

One is paper - making strategy. It is to be a fair and equitable measure student mastery of the knowledge, the more difficult for the candidates to generate quite different from each other and papers, and the existing examination system often used randomly selected method, backtracking heuristics, genetic algorithms. Another method is marking Intelligent. Rely on artificial intelligence for automatic marking is the basic function of the mass paperless examination system and the inevitable choice [6]. In a specific development process, the answer for the characteristics of different kinds of questions, design and select the most appropriate

scoring policy, to prepare a suitable smart scoring system[7, 8].

### 3. Methodology

The Paper examination system is the most important part it is important to evaluate the scientific basis for students to acquire knowledge of the situation. It is influenced by various factors of subjects of mutual restraint, Proposition range, score, time, difficulty, discrimination, etc., between, which means that it needs to develop rules for quantitative analysis of various factors, the use of certain algorithms, in order to create a more reasonable test paper. This is also the key to the Intelligent test paper. In addition, in order to reduce the burden of scoring staff to improve the efficiency of scoring, while ensuring the fairness of the examination results [9-11], marking the intelligent use of artificial intelligence, it is an important way.

#### 3.1 Intelligent Test Paper Based on Genetic Algorithms

Genetic Algorithm (GA) is a simulation of natural selection and genetic mechanism of an optimization algorithm, simple and general, universal, suitable for parallel processing, excellent global optimization problem. GA wooden base idea is based on Darwin’s theory of evolution and Mendel’s genetics [12]. In nature, environmental adaptability biological species through the “survival of the fittest, survival of the fittest” rule to measure. In the genetic algorithm [13], the fitness function is used to judge the extent of the merits of the individual papers population.

This design of test systems, test database attributes include: question types, question number [14], question text, answer questions, difficulty, discrimination.

The main difficulty of this question refers to all personnel reference purposes losing rate. The formula is:

$$N = 1 - \bar{X}/M$$

Formula,  $N$  on behalf of item difficulty values;  $\bar{X}$  on behalf of all subjects’ average score on this theme;  $M$  represents the value out of the question.

The Difficulty level is divided into five grades, as shown in the following table 1.

Difficulty Level	1	2	3	4	5
Difficulty Factor	0-0.2	0.2-0.4	0.4-0.6	0.6-0.8	0.8-1.0

Table 1. Item Difficulty Level

Discrimination is mainly to distinguish between different levels of students’ level of ability, the paper according to the high and low scores to student achievement sort of 30% in front of a high packet, 30% back as a low group, and then calculate the average score PL low packet and the average score PH high packet, if  $M$  stands out, which is calculated as follows:

$$Q = PH - PL/M$$

After extensive research and testing, discrimination standards in the following table 2.

Discrimination Index	Evaluation
More than 0.9	Excellent
0.4-0.89	Good
0.3-0.39	Medium
0.2-0.29	General
Under 0.19	Inferior

Table 2. Evaluation Criteria to Distinguish between Questions

### 3.2 Intelligent Fuzzy Close to Scoring Match

Ratings for the English title, a lot of experts in this area have been studied and discussed. The compiler is generally divided into two phases: phase analysis and synthesis stage. Structural analysis phase analyzes the English exam answers, check compliance with the provisions of the language, including lexical, syntactic, semantic analysis. Comprehensive analysis phase, according to the target structure required by code procedures. If you find an error source, not only reporting errors, but also for error handling, so the compiler can be continued in the compilation process.

Therefore, we consider an Intelligent scoring system can be used to compile this principle, the standard answers are compiled and candidates answer, then fuzzy nearness matches, thereby performing fractional statistics.

## 4. Result Analysis and Discussion

### 4.1 Feasibility Analysis of Genetic Algorithm Improved

This exam tests a total of more than 3,000 test questions, test paper constraint information: noodles out of 100 points: the overall degree of difficulty of 0.5, tolerance disabilities 0.05; item structure of six kinds of questions, 90 minutes, allowing the error  $\pm 5$ ; the scale of the initial population: 100.

Our genetic algorithm and improved genetic algorithm through the same evolution algebra optimal fitness value comparison of the two algorithms produce. Take evolution algebra 10,20,50,100,200, run the following table 3.

Evolution Algebra	Genetic Algorithm	Improved Genetic Algorithm
10	0.528	0.439
20	0.712	0.683
50	0.872	0.861
100	0.885	0.955
200	0.889	0.987

Table 3. Evolutionary Generation and Optimal Fitness

### 4.2 Fuzzy Close to Matching Strategy for Standardized Scoring Impact

Because reading comprehension in English exams very representative, in order to fully verify the functionality and accuracy of the scoring model scores, whichever is 6 (A, B) = 0.15, P = 0.7, to read for the exam organized 30 languages in accordance with 10 students in groups of three exams, and in strict accordance with the evaluation criteria by a manual scoring for each of the respondents, respectively, record the score results. The results are as follows (as shown in the table):

Exam Event	People Scoring Correct Number	System Scoring Correct Number	People Scoring Error Number	System Scoring Error Number	Average Score	Deviation
1	20	20	44	49	6.9	0.1
2	18	18	57	51	6.7	0.1
3	21	21	41	47	7.2	0.2

Table 4. Comparison of artificial Intelligent scoring and people scoring

These two experiments showed that: the test paper system high efficiency, high speed, high precision marking, can be comprehensively recorded traces of judge candidates to answer, solve the problem of subjective marking Intelligent program theme is reflected in a fairer and objective examination of students' abilities system.

## 5. Conclusion

In this paper, we analyzed the Intelligent standardized test system. In order to design an optimized intelligent standardized English test system combined with artificial intelligence. Based on analyzing the key issues of the test system, through improved Genetic Algorithm to refine the rules for Intelligent test paper, and fuzzy matching close marking intelligent with efficient checking English speech, grammar and other issues, to solve the problem that it is too heavy to score in the large English by people scoring. Compare and optimize intelligent examination system which has reasonable software architecture by analyzing the experimental results, the comprehensive test paper algorithmic rules and powerful, efficient and accurate scoring system and effective feedback scoring ability.

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