Optimization of Intelligent Evaluation of English Diagnosis System Based on Particle Swarm Optimization

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Abstract. With the rapid development of science and technology, people have put forward higher requirements for work efficiency and living environment. In order to better meet these requirements, various intelligent systems designed have also received more and more attention. In order to improve the quality and efficiency of English teaching, reduce the cost of teachers and better meet the needs of students, this paper proposes an intelligent evaluation optimization method for English diagnosis system. This paper mainly uses the methods of experiment and comparison to analyze the students' achievements. The experimental data shows that if the threshold value is between 0.2 and 0.3, it can be seen that the error rate is very high, so we need to refer to the new synthesis rules to repeat the calculation to avoid large diagnostic errors caused by incomplete corpus.

Keywords: Particle Swarm Optimization, English Diagnosis, Intelligent Evaluation, Optimization System

1 Introduction

Particle Swarm Optimization (PSO) is a method that simulates the evolution process of organisms to optimize the search space. In this paper, an English intelligent evaluation system based on Particle Swarm Optimization (PSO) algorithm is proposed, which combines the analytic hierarchy process (AHP) to synthesize the artificial neural network (ANN) and predict the single neuron. The English diagnosis system based on particle swarm optimization can analyze different types, levels and work properties accurately and reasonably. In the field of English diagnosis, expert system is a very important application. In the design of the system, it is necessary to fully consider the influence of particle swarm optimization on the global and local search ability, and at the same time ensure the calculation accuracy.

There are many theories about particle swarm optimization and English diagnosis system. For example, some scientists have proposed a distributed task allocation algorithm for multi-agent systems based on particle swarm optimization, which can

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solve conflicts [1-2]. Some scientists try to use population algorithms and genetic algorithms to generate test copies [3-4]. In addition, some experts put forward the principles, main design and implementation of the intelligent scoring of non-standard test questions and personal ability assessment in the English diagnostic assessment system [5-6]. This paper mainly studies the intelligent analysis of English diagnosis based on particle swarm optimization, and constructs a set of scientific and reasonable test case model that can effectively use resources and share data.

In this paper, the particle swarm optimization algorithm is studied and described. Secondly, the composition and advantages of the English diagnosis system are analyzed. Then analyze the methods and elements of intelligent evaluation. Finally, relevant data and conclusions are drawn through the design and experiment of intelligent evaluation optimization system.

2 Intelligent Evaluation of English diagnosis System Based on Particle Swarm Optimization

2.1 Particle Swarm Optimization

Particle Swarm Optimization (PSO) is a random intelligent optimization calculation method. Its basic idea is to gather some points in the individual space and form a group by sorting these sets. This process is often called particle acceleration. In practical applications, this principle can be used to realize problem solving, dynamic planning and decision analysis in many fields. Particle Swarm Optimization (PSO) is to achieve intelligent optimization to a certain extent by simulating organisms in nature. Due to the mutual influence between individuals and the characteristics of randomness, population diversity and high degree of incomplete information, it is impossible to accurately calculate and optimize the solution, so it is necessary to optimize the algorithm [7]. In the learning process of particle swarm optimization algorithm, the problem is described first, and then the individuals are connected according to different characteristics. First, map the target function value to the known parameter. After the optimal solution is obtained by analyzing and processing the training data, the calculation results are returned to each category. The learning process of particle swarm optimization is mainly divided into particle random selection and search strategy. When searching for the optimal solution, according to the best individual found, the closest global solution is obtained through continuous iterative calculation. The search strategy can solve the problem that many uncertain factors in the randomness problem or local extremum problem lead to the failure of accurate search and the inability to accurately obtain the global minimum point and other feasible scheme information. At the same time, it can overcome the premature phenomenon of particle swarm optimization and improve the defect of slow convergence [8].

First, a single particle searches for the global optimal solution through random probability distribution, and then takes it as the most concentrated set of individuals in the population. Secondly, unsupervised learning and local search methods are adopted according to the large number of groups within the group. Finally, each individual is allocated according to certain criteria. Each population belongs to different positions and has similar characteristics with other species combinations, forming a new internal

structure of the population, and in this case, the diversity and global optimal solution are generated. By adjusting the parameters to meet the optimal solution, the global operation speed of the system can be improved, and the functions of dynamic control and tracking can be realized. At the same time, it can also reduce the amount of computation, reduce the cost of computation and improve the convergence [9].

2.2 English Diagnosis System

In practical applications, the neural network of the system often has a high level of intelligence. It can not only process, analyze and judge analog signals. It can also adjust its functions according to the changes of external environmental conditions. Therefore, English diagnosis technology is also a highly automated technology.

English diagnosis refers to the information collection, detection and analysis of a specific object in a certain environment. It is a method of automatically identifying and processing the relevant information obtained in the system on the computer and converting it into regular output. English diagnosis refers to the use of correct, appropriate and scientific testing methods to detect students' learning status or foreign language use within a certain range through the mastery of linguistic theories and methods with language as the intermediary [10]. There are two main methods in practical application: one is to select the appropriate mode according to the specific situation and use the specific mode to test the system performance index. The second is to use the existing technical means to detect the input information and obtain the corresponding results. The intelligent evaluation and diagnosis system is shown in Figure 1:

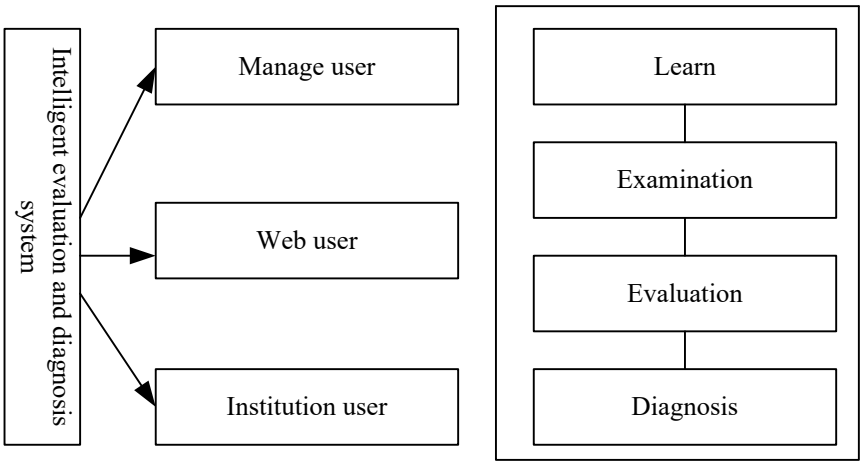

Fig 1. Intelligent Evaluation and Diagnosis System

In the English diagnosis system, the commonly used methods are text type, audio and video type, etc. These methods have their own advantages and disadvantages. Audio and video analysis is an advanced online diagnosis technology. Speech information classification and recognition is currently the most popular and effective method for English listening language identification mainly using this technology [11]. Word frequency detection is used to determine whether sentences or words are

translated into Chinese phrases accurately, but it is difficult to determine the correctness of some special sentence patterns. In sentence similarity, the correlation between the query sentence and the text is expressed as:

$$S = \sum_{i=1}^{m} PG_{\mathrm{i}} \tag{1}$$

PG is used to indicate the frequency of words. Inverse text frequency index:

$$\mathrm{Z} = \log \frac{C}{C_v} \tag{2}$$

Weighted sum of correlation calculation formula:

$$S = \sum_{i=1}^{m} PG_i \times QCG_i \tag{3}$$

The stronger the ability of a word to express the main idea, the greater the weight.

The design of this system is a simple introduction to English diagnosis based on relevant knowledge. In the whole development process, we use the Java language development tool to complete the connection between the function module and the database, and use Java Web application technology to realize the functions of data processing, web page loading and operation control. At the same time, the front-end browser can also support the interactive operation of WEB files. The development of the English diagnosis system is a complete process, including data management, report generation and result analysis, as well as test planning and control modules. This subsystem is composed of JavaSSM framework software and SQL database management system [12]. The English diagnosis system is developed on the basis of computer language processing technology and network communication. It has strong applicability and can be used in various types and different forms of learning.

The system is an online diagnosis information integration library based on windows platform. By analyzing the original database and language dictionary, all the corpus resources involved in English diagnosis are obtained. Before English diagnosis, you must enter some important text for the user, which will contain a lot of information. The English diagnosis system based on artificial intelligence takes language as the research object, optimizes and transforms the traditional computer technology and intelligent information processing, and realizes the automation from data collection to classification analysis and query. When designing the system, we should first ensure that each module in the system can be independent of each other and support each other. The second is to ensure that the data transmission process is not disturbed and there are no errors. Finally, it is necessary to provide users with accurate, efficient, real-time and reliable results and feedback information for the entire evaluation work.

2.3 Intelligent Evaluation and Analysis

The requirements for intelligent evaluation and optimization of English diagnosis system mainly include the following aspects: analyze the problems existing in the system, find out the factors affecting the recognition accuracy and accuracy, and propose a new method to improve. This method can calculate the corresponding equipment operation status information under different types of faults. At the same time, it can also convert data into computer language signals. So as to realize the comprehensive evaluation and prediction decision-making process of the interdependent relationship among the target machine performance, machine learning ability and neural network structure.

Intelligent evaluation is to conduct a comprehensive analysis of the system to determine whether it meets the requirements, so as to make a correct judgment and formulate a scientific and reasonable improvement plan. Intelligent evaluation system is a comprehensive evaluation system with multiple functions. Its performance varies greatly in different types of applications. The intelligent analysis system of English evaluation based on particle swarm optimization algorithm is mainly used to accurately describe and evaluate a large amount of data involved in the application of computer language by integrating, real-time and diverse features.

In the process of system design and implementation, due to the lack of data analysis and collation, accurate evaluation indicators cannot be obtained. Therefore, further optimization is needed for these problems. Particle swarm optimization has certain advantages in multi-dimensional information fusion. The classification based on different levels (such as depth, length and other dimensions) has good adaptability and applicability.

In the system, each neural network node will adjust its own parameters to better serve the accuracy of problem identification. In order to improve the recognition accuracy and data processing level. We need to build an intelligent information model. Before system design, we must describe the objects, problems and conditions involved in the whole evaluation process in detail. The traditional artificial neural network is optimized by intelligent analysis and prediction algorithm. At the same time, it can also use the model predictor to automatically complete various data modeling, reasoning calculation and other work.

3 Intelligent Evaluation Optimization System Design

3.1 System Development Environment

The system uses MyEclipse 9.5 to develop Java programs, and uses the ontology development tool Protege3.5.6 to build English knowledge ontology. The system uses the relational database MySQL 6.0 to store user data and other basic information, and Allegrograph RDF stores 4.3 to store English knowledge ontology data. The problem solving process of the exercise is saved in XML file format. The system uses mysql-connector-java-5.1.6-bin.jar to connect and operate the MySQL database. It uses graph.jar to connect to the Allegrograph server and run the Allegrograph database. It uses jfreechart -1.113. jar to display the concept map.

3.2 System Structure Design

Based on the three-tier development of standards, the intelligent evaluation system is divided into three layers: presentation layer, business logic layer and data access layer. The presentation layer and business logic layer are developed in Java. The mathematical knowledge ontology is first exported to the OWL file, and then stored in the Allegrograph database. The business logic layer uses AllegroGraph API to access mathematical knowledge ontology. The user data model is stored in the MySQL database, and the business logic layer uses JDBC to access the user data model. The overall architecture of the system is shown in Figure 2.

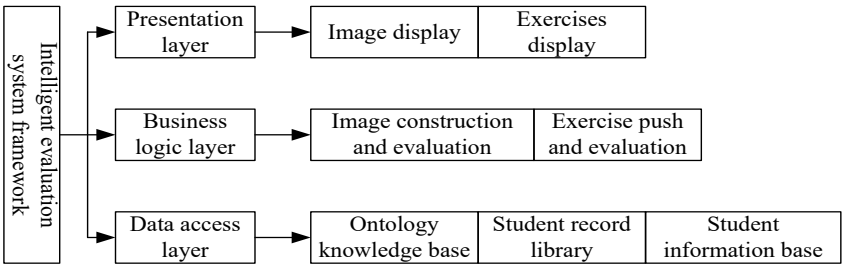

Fig 2. Intelligent Evaluation System Framework

The data access layer is mainly used to store the data used by the system, such as knowledge ontology, student learning records, etc. The business logic layer is mainly composed of several main functional modules, which are used to design and evaluate concept maps, push and evaluate exercises, etc. The presentation layer mainly interacts with learners. Students can choose the evaluation mode, create concept maps and evaluation exercises.

3.3 Test Plan

A global test was conducted in a 60-person classroom, and data samples were collected from the unit test conducted in the second semester of a primary school in the region. Because standardized test problems are easy to diagnose and implement, standardized test problems are not included in the test. The test mainly tests the performance and error rate of composition problems.

The following test cases are briefly described:

Test steps:

Students register on the special website through the Internet and enter the default examination room to reply in time.

Every student must write an article

After the time, the system will automatically send student replies.

Run diagnostics and create reports from the background management interface.

4 Analysis of Evaluation results

4.1 Personal Diagnostic Test

The students with the highest and lowest scores will be selected from the examination class for personal examination. The diagnostic results in the following table are

obtained through diagnosis, where S is the threshold for defining similarity, the corresponding result is the score, and the time spent (in seconds) is the standard score.

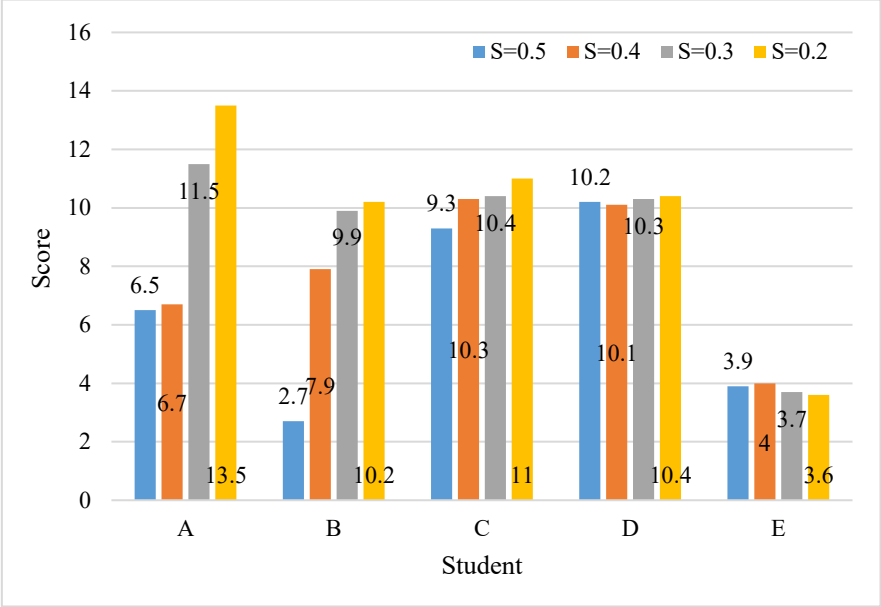

Fig 3. Score of Individual Diagnostic Test

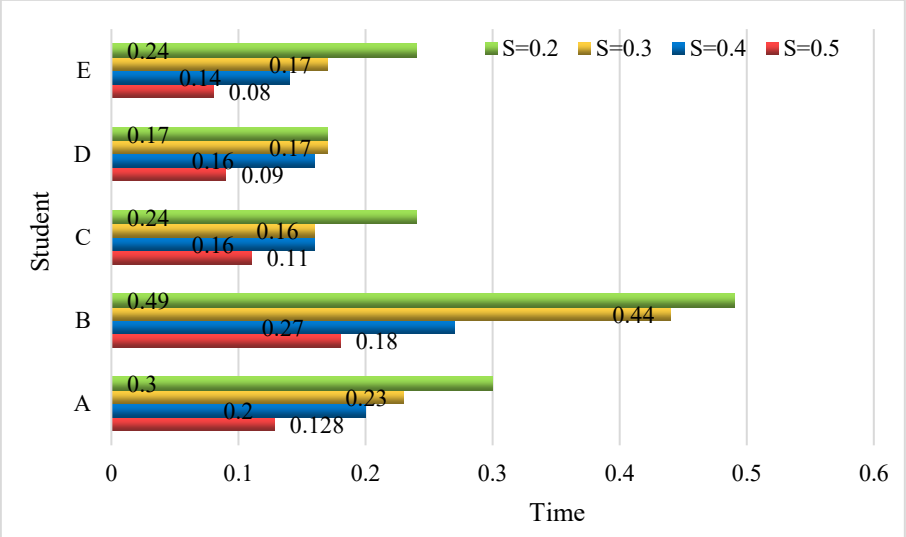

Fig 4. Time of Individual Diagnostic Test

As shown in Figure 3 and Figure 4, we can see that with the decrease of the similarity threshold, the number of rules that can correspond to the composition of students

increases significantly, and the number of corresponding rules and the calculation of the minimum processing distance increases significantly. At this time, the calculation time increases significantly. Therefore, for large applications, the performance is significantly reduced, and the accuracy and speed of composition evaluation must be weighed. However, in Internet applications, user experience is very important, so it is very important to select an appropriate threshold.

4.2 Class Composition Diagnosis Results

After receiving the score sheet from five front-line teachers, the average score of 60 students in the class was 12 points. This is the default value of the average score in the constituent class. The specific calculation data is shown in Table 1. After passing the individual and class examinations, the error is less than 10%, and the gap is less than 3 points, which reaches the design goal and can be used in practical applications.

Table 1. Class Composition Diagnosis Results

	Score	Error
S=0.5	9.4	6.5
S=0.4	9.7	6.8
S=0.3	10.4	7.9
S=0.2	10.8	10.2

5 Conclusion

This paper analyzes the English diagnosis system based on particle swarm optimization algorithm from two aspects of hardware equipment and software technology, and proposes an improved intelligent evaluation optimization system combined with practical application. This method can overcome the problems of subjectivity and feedback lag in traditional manual testing. In this paper, the combination of genetic optimization algorithm and ant colony evolutionary search is used to improve the evaluation quality, and the comprehensive performance of the system is evaluated by multiple indicators on the basis of ensuring efficiency and reducing energy consumption. This paper mainly studies the intelligent simulation of the English diagnosis system using the artificial particle swarm optimization algorithm, which is verified by the simulation experiment.

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