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Informatization Construction of College English Learning Platform Based on Particle Swarm Optimization Algorithm

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Abstract: The application of information technology in the education industry is more and more extensive, so that students can achieve remote autonomous learning. Internet-based English teaching platforms are diverse, providing knowledge learning, online testing and other functions. But from the current situation, there are some problems, such as the lack of strong pertinence and self-adaptability, the lack of test selection strategy, and the lack of analytical ability. In view of the problem that the English learning platform does not have the ability to record user history learning information, every learning situation of students is recorded into the database, and the current learning situation of students is analyzed based on particle swarm optimization algorithm, and specific learning suggestions are given, so as to improve the efficiency of students' autonomous learning.
Keywords: Particle Swarm Optimization; College English; Learning Platform; Information Construction

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1. Introduction

English learning platform is developed to meet the needs of college students and social personnel to improve their English level. After years of development, it is widely used on the Internet and has great influence on various platforms. The application of computer in the construction of college English platform began in the early 1970s, and related concepts were put forward and studied as a relatively independent field. The application of the computer technology has changed the traditional exam mode into the mouse and keyboard. The core is to construct the test item selection strategy based on computer, and select and organize the test items according to the actual ability level of the testees, so as to more objectively test the knowledge of the testees, including the measurement of their ability, level and other indicators .

The advantage of introducing PSO is that it can give consideration to the width and precision of the test and provide the most suitable test questions for the test subjects of different levels.

2. Proposed Method

2.1 Introduction to particle swarm algorithm

Particle swarm optimization (PSO) is an intelligent algorithm based on the simulation of swarm foraging. It was proposed by The United States and inspired by Darwin's natural selection. The main idea is to model and simulate the group behavior of birds. In the study of the group behavior of birds, it is found that in the process of foraging, birds not only search for themselves, but also track their neighbors. If a bird finds a food source, all the neighboring birds will approach. When it encounters a large number of food sources, it will drive the birds to gather together. Particle swarm optimization (PSO) algorithm is simulated from this model and used to find optimal solutions in various problems. Its main idea is the mutual communication and updating of information between individuals and subjects, and learning from a "winner" (i.e., the optimal solution) and imitating (i.e., gathering) so as to obtain the optimal solution, which is also called particle sociality. PSO algorithm, which is composed of a single particle population, each particle represents a problem of the feasible solution, food represents the global optimal solution of problem, in order to make the particles close to the optimal solution, typically by the corresponding fitness function to determine the stand or fall of particles, particles under the velocity function constantly adjust the search range and direction, in order to ensure close to the optimal solution, The particles constantly update their position, compare and screen the individual optimal (PBest) they seek with the global optimal, and finally all converge to the global optimal. This model is the velocity and position model of standard particle swarm optimization algorithm.

2.2 Improved particle swarm optimization

Particle swarm algorithm and genetic algorithm of PSO algorithm search the optimal solution from two directions at the same time, individual optimal (best), namely, each particle in a certain direction to find the optimal, group, is the global optimal solution, are the result of optimization, each individual in search of the optimal, the optimal by comparing group for replacement, until you reach

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the optimal solution. The algorithm steps are as follows:

(1) Initialize PS0 parameters. Including particle swarm size, iteration times, CL, C2, country, etc; (2) Initialize pBest by copying its own value; (3) Initialization curve EST: adopt the minimum adaptive value; (4) Update particle velocity and position; (5) Using formula (3.24) to conduct optimal genetic evolution of particle swarm: (6) To meet the optimization requirements, repeat Step 5: (7) Output optimization results. Gantt chart is generated by combining optimization results with machine state.

The speed and location of updates are expressed by the following formula:.

$$v_i^{k+1} = \varpi v_i^k + c_1 r_1 (p_i^k - x_i^k) + c_2 r_2 (p_i^k - x_i^k) \quad (1)$$

$$x_i^{k+1} = x_i^k + v_i^{k+1} \quad (2)$$

3. Overall design of English learning platform

3.1 Logical architecture design

The design of the system logical architecture of the English learning platform is mainly from the perspective of the system developers, to analyze the development components at all levels of the system and get the logical architecture scheme of the system. The system adopts Struts2, Spring and Hibernate frameworks of JavaEE to realize each function module of the platform, including four components: performance layer, business logic layer, service layer and data persistence layer. Presentation layer is the system platform and the interaction between the user interface, its development is based on the results of a Web page, use the browser software, mainly including the students' learning, teacher management, teaching management, system management part four, is responsible for the user instructions and data acquisition, and the processing results show; The business logic layer is based on the design requirements of the system function modules to build business logic implementation components, and the result of its development is software components.

3.2 Physical architecture Design

The physical architecture design of the system is shown in the figure. Customers access the server through the Internet, and use a firewall to isolate the trusted and untrusted zones. Switches, Web servers and database servers are located in the trusted zone. The database is deployed on the database server and the Web application is deployed on the Web server.

4. Discussion

4.1 Experimental effect of English learning platform

In practical engineering applications, it is only necessary to give corresponding weight coefficients for each objective function according to past experience and judgment of actual demand, and then the corresponding values can be obtained through particle swarm optimization. The results of the algorithm are shown in the table

Table1. Optimization results of prior method under different weights

The weight distribution			The optimization results	
Transmission efficiency	Migration resistance	volume	Core position of primary side/mm	Secondary core location/mm
0.8	0.1	0.1	-0.69	-0.56
0.1	0.8	0.1	11.97	11.94
0.1	0.1	0.8	-11.92	-11.96
0.33	0.33	0.33	-2.05	-2.43

As can be seen from the above chart, the optimization direction of the English learning platform mainly points near the center, while the optimization direction of the particle swarm optimization algorithm obviously points to the inside of the coil. The optimization results for weight distribution in the table also well reflect the different optimization directions of these three objectives. For example, when the optimization for particle swarm optimization is dominant, the weight value is 0.8. The informatization construction of college English learning platform based on particle swarm optimization algorithm can effectively improve the efficiency of college English learning.

5. Conclusion

This paper expounds the implementation steps of the selection strategy, and applies it to the implementation of the actual English test selection module, which has achieved good application effect. This paper also aims at the problem that the English learning platform lacks the ability to record user history learning information, the wrong question set, learning track, wrong question set, etc. Each learning situation is recorded into the database, and on the basis of particle swarm optimization algorithm, the current learning situation of students is analyzed, and targeted learning suggestions are given, so as to improve the efficiency of students' autonomous learning.

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