Quality Evaluation System of English Innovative Teaching Based on Hybrid Optimization Algorithm

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Abstract: Promoting the overall level of Chinese national English can promote the development of my country's social economy, and the key to improving English level lies in students. To improve English level, it is necessary to innovate English teaching methods. This paper designs an English innovative teaching quality evaluation system, and its research will help to deeply understand the problems existing in English innovative teaching, prompting teaching decision-makers to adjust English teaching strategies, thereby improving the efficiency of English teaching and creating a good environment for English teaching evaluation, improve the quality and efficiency of teaching evaluation, and then improve the quality of English teaching as a whole. This paper implements the system's user login function and evaluation result statistics function after testing the system, and compares the scoring results of the ant colony algorithm, genetic algorithm, and their hybrid optimization algorithms on the four dimensions of teaching quality, and obtains the hybrid optimization. The algorithm's score calculation accuracy is higher.

Keywords: Hybrid Optimization Algorithm, Innovative English Teaching, Teaching Quality, Evaluation System

1. Introduction

The quality evaluation of innovative English teaching is a powerful driving force to improve the teaching level of English teachers. Teaching quality assessment is a multi-period, repeated means of improving the overall teaching level. Whether it is a university or an educational institution, some problems in teaching can be found in time through the evaluation of teaching quality, and then the problems reflected can be improved, so as to achieve the purpose of improving the level of English teaching and enhancing the teaching effect.

At present, there are countless related researches on the English innovative teaching quality evaluation system based on the hybrid optimization algorithm, and the research results are good. For example, some colleges and universities emphasize the necessity of evaluating the quality of English teaching in teaching and research work. The educational administrator is to revise the previous English teaching quality evaluation workflow and improve the evaluation-related system to reflect the requirements of English teachers to innovate teaching methods and improve teaching quality. Through the revised teaching quality evaluation rules, it is expected to improve the level of English teaching [1]. A scholar pointed out that in the era of fairly developed and advanced modern technology, the teaching quality evaluation in the field of education should also keep up with the pace of the times. He believes that the current teaching quality evaluation is inefficient and the evaluation subject is limited to students. The systematic evaluation method allows the evaluation subject to smoothly carry out the evaluation of the teaching quality of the evaluation object, and he proposed to develop a system for students, parents, teachers and other evaluation subjects [2-3]. Although the research on the teaching quality evaluation system has made remarkable achievements, the evaluation efficiency is low, and it is urgent to develop an evaluation system to speed up the evaluation pace.

This paper puts forward the functional requirements, non-functional requirements and performance requirements of the design of the English innovative teaching quality evaluation system, and then designs the evaluation system based on the B/S platform architecture, and combines the ant colony algorithm and the genetic algorithm to form a hybrid optimization

algorithm. By comparing the teaching quality scoring results of these algorithms, the precise evaluation performance of the hybrid optimization algorithm is determined.

2. Hybrid Optimization Algorithm and System Requirements Analysis

2.1 System Requirements Analysis

(1) Analysis of functional requirements

The main functions of the English innovative teaching quality evaluation system are: student evaluation, teacher self-evaluation, statistical query, user account management and other functions. Since the system has different user roles, appropriate permissions must be defined for different users to ensure database security [4]. In order to facilitate users to experience system functions, we adopt the same login interface for users of each identity, and ensure the simplicity of the interface. When the user logs in, the server will detect the user's identity information, and then return to a different operation interface, such as the student's operation page functions include grading teachers, grading school management services [5] .

(2) Non-functional requirements analysis

Openness: The system adopts advanced design concepts and implementation technologies to ensure that the functions of the system can be shared externally in the form of services to achieve interoperability with other systems. The whole system is developed with .NET technology, so that the system can easily run on a server with Windows operating system [6].

Normative: The system development strictly follows the rules of software development and is designed based on a unified software development model. The program code is standardized in the development process, there are corresponding code restrictions, and relevant documents are required [7].

Reliability: When the system is delivered, it needs to be in a state of stable operation and stable deployment. Before the system is used, a comprehensive, in-depth and detailed software test is required to ensure the stability of the system operation.

(3) Performance requirements

As a practical system, the teaching quality evaluation system not only requires perfect functions, but also some performance requirements are also essential [8]. It mainly completes teaching quality management, teaching order management, curriculum setting management and teacher information management. The performance requirements of the system are described in the following aspects:

Whether the designed teaching quality evaluation system has good scalability [9]. With the rapid growth of school enrollment scale and school teaching information, it is required that the system we design should have good compatibility when software and hardware are expanded, and have good adjustability when application requirements change.

Whether the designed system can support efficient data processing and transmission functions, can meet the simultaneous access of multiple different users, and can ensure the integrity and consistency of data when users access concurrently, so as to adapt to the situation that most students evaluate teaching quality at the same time requirements, as well as the requirement for multiple teachers to query the evaluation results at the same time. Data security and independence requirements. Unauthorized functions cannot be allowed to be used for unauthorized users, nor can users be allowed to access unauthorized data [10].

2.2 Hybrid Optimization Algorithm

After the ant colony algorithm constructs the candidate solution, the pheromone is put into the component of the solution used, and it is used as the pheromone of the probability transfer formula in the later ant colony algorithm. On this basis, the constraint relationship is fully considered. It has been improved, combined with genetic algorithm to form a hybrid optimization algorithm, and redistributed resources to obtain a more effective allocation strategy [11-12].

$$\tau_{ij}(t+n) = \rho \times \tau_{ij}(t) + \Delta\tau_{ij} \qquad (1)$$

$$\Delta\tau_{ij} = \sum_{k=1}^{m} \Delta\tau_{ij}^{k} \qquad (2)$$

Among them, n represents the time, ρ represents the parameter, $\Delta\tau_{ij}^{k}$ represents the amount of information left on the path ij by the kth ant in the cycle, and $\Delta\tau_{ij}$ represents the increment of the amount of information on the path in the cycle.

3. System Design

3.1 System Architecture Design

The design of the evaluation system adopts the B/S three-tier architecture. In this structure the user interface can be implemented entirely through the browser, performing the responsibility of submitting the evaluation business processing logic system using the result presentation layer, the data layer is to provide database support, the client operates in hypertext, it sends data to the server request is in the form of text transmission. The server judges and processes its request. When it is judged that it has the right to read the database, it processes the data, then returns the result to the client, and finally displays it in the form of hypertext to the user. The distributed B/S mode is the form structure of the questionnaires generated by the browser to evaluate the students' past experience, and then directly sent to the online client for background processing to the application server, which can intelligently evaluate the data.

3.2 System Function Module Design

The main purpose of the development of this system is to help the teaching management departments and grassroots teaching units of each school to improve the management efficiency of English teaching work, and to realize the high efficiency of the management of the school English innovative teaching quality evaluation system . According to the main functions and tasks that the system needs to achieve, the functional modules of the system are shown in Figure 1.
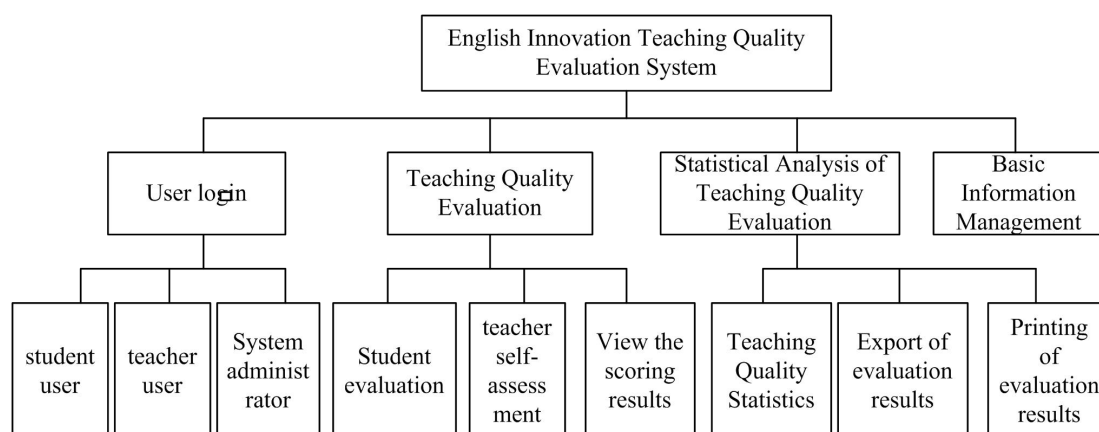

Figure 1. System function modules

(1) User login module
The teaching quality evaluation system should provide different pages and functions for different users. Its users include students, teachers, and administrators; this function implements some management of system users, permissions, and system parameters.
(2) Teaching Quality Evaluation Module

This module includes sub-modules such as student evaluation and teacher self-evaluation, as well as scoring results viewing. Both students and teachers can rate the quality of innovative English teaching, but the function of viewing the scoring results is limited to teachers only.

(3) Statistical analysis module of teaching quality evaluation

This module includes a teaching quality statistics sub-module, an evaluation result exporting sub-module, and an evaluation result printing sub-module. The evaluation results can be queried and printed through the system, and the query results can be downloaded to the local in the form of Excel for saving and further analysis by other statistical software. In addition, the system also provides a graphical display of statistics. report function.

The statistical analysis module provides rich statistical functions, enabling users to perform multi-dimensional statistical analysis on business data in the system flexibly. In addition, the system also provides to save the user's statistical process as a user-personalized statistical theme. Really realizes custom statistics to suit the change of user's statistical needs.

(4) Basic information management module

The basic information management module provides the maintenance interface for the application system and related software and hardware in the background, and realizes the maintenance of the basic data of the system. This module can only be used after authorization authentication, because the basic database data is very important, which is related to the normal use of the system.

4. System Testing and Application

4.1 System Operation Test

Table 1. Run Test Results

	set value	test value
CPU usage	<63%	55%
memory usage	≤47%	42%
reaction speed	<3.8s	2.13s

This experiment tests the CPU occupancy rate, memory occupancy rate and system response speed of the system, in order to ensure the normal operation of the system. The test results are shown in Table 1. It can be seen that these three test contents are all within the system setting value range. Therefore, it meets the design requirements negatively.

4.2 Implementation of Evaluation Function Based on Hybrid Optimization Algorithm
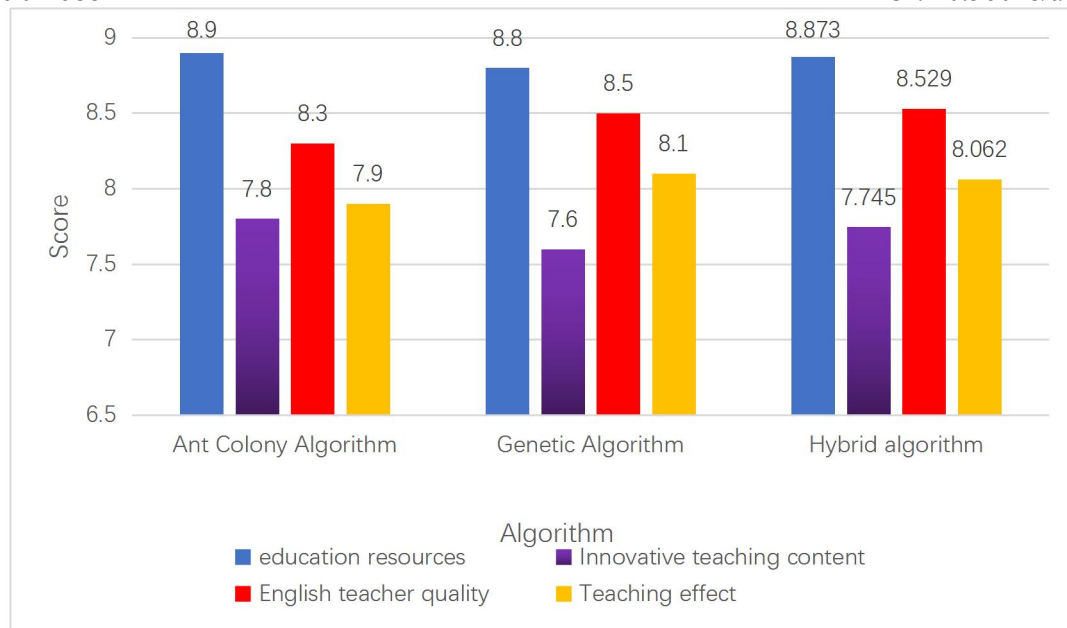
Figure 2. Scoring results

This experiment uses the ant colony algorithm, the genetic algorithm and the optimization algorithm combining the two algorithms to calculate the teaching resources of innovative English teaching, and the scoring results of the four dimensions of innovative teaching content, English teacher quality, and teaching effect, with a total score of 10 points. The scoring results are shown in Figure 2. The scores of the three algorithms are similar, but it can be seen that the score of the hybrid algorithm is accurate to three decimal places, indicating that the optimization calculation of the hybrid algorithm of the ant colony algorithm and the genetic algorithm makes the score more accurate.

4.3 Implementation of System Function Modules

(1) Implementation of user login module

The login module is the entrance, and the login identities include students, teachers and administrators (educational administrators and system administrators). All users must verify their identity by entering their account and password . After the identity verification is passed, they can enter the system and use the corresponding functions authorized by the system. The first thing to pay attention to in the system of B/S structure is system security. Students or teachers who access the system must ensure that they cannot bypass the login page and directly enter the evaluation page. The system uses Session variables to detect, and immediately forcibly terminates the program when an illegal user logs in, preventing illegal users from bypassing identity detection and directly participating in the evaluation. After the student completes the login, the evaluation function of the relevant teacher's teaching quality and the query function of the evaluation result. To realize this function, students must first complete the user login of the system, and only authorized users can log in to comment, and according to the requirements of the school, how many records of the teacher must be assessed and commented. After the teacher logs into the system, its main function is the query function, which can query the students' evaluation results of themselves.

(2) Implementation of scoring result statistics module

The scoring statistics module includes viewing the detailed results of the assessment, viewing the overall assessment information, printing functions, and exporting functions, allowing users to export the assessment results to an Excel file, which is convenient for users to use. The statistical analysis system provides various business and object-oriented analysis methods such as report statistics, trend analysis and intelligent comparison, and can realize multi-dimensional and multi-form display of statistical information by relying on visual display technology.

5. Conclusion

The English innovative teaching quality evaluation system can use its own level of interactivity and informatization to guide schools to find the most appropriate development and innovation direction in the evaluation process, and further promote the more effective development of English teaching research. The evaluation system designed in this paper is tested, and the test results reflect the feasibility of the system in this paper. The effectiveness of the hybrid optimization algorithm is verified by using the ant colony algorithm, the genetic algorithm and the hybrid algorithm to calculate the teaching quality score. Therefore, the system designed in this paper can be applied to the evaluation of teaching quality, and the system can improve the evaluation efficiency by calculating and sorting out the evaluation results by itself.

Acknowledgments

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