Research Article

Design of Student Homework Management System in Private Colleges and Universities Based on Computer Software Technology

Jing Li 1 and Hua Sun 2

1 School of Economics and Management, Hainan Vocational University, Haikou, Hainan 570216, China
2 School of Information Science and Technology, Qiongtai Normal University, Haikou, Hainan 571127, China

Correspondence should be addressed to Hua Sun; sh@mail.qtnu.edu.cn

Received 23 July 2022; Revised 3 September 2022; Accepted 6 September 2022; Published 28 September 2022

Copyright © 2022 Jing Li and Hua Sun. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

This paper takes the job management of a private university as the research object and analyzes the function, performance, and operating environment of the job management system. We design the overall design scheme of the job management system according to the requirements and carry out the general design, detailed design, and database design of the system. By comparing and analyzing the characteristics of different MPPT algorithms, in view of the shortcomings of the fruit fly optimization algorithm, this paper proposes an improved fruit fly optimization algorithm to realize the maximum power point tracking of photovoltaic systems. The initialization position is improved, and the iterative optimization is carried out by means of variable step size. Compared with the traditional fruit fly optimization algorithm, the improved algorithm has a faster convergence speed, and the optimization process is stable and less oscillating, and the tracking of MPPT is improved. The accuracy can effectively avoid the system falling into local optimum. Based on the understanding of user demand analysis, the problems to be solved by this system are obtained, and solutions to these problems are given. Through the analysis and comparison of various technologies commonly used in the current website development and combined with the characteristics of the problem, the ASP-based Browser/Server (B/S) architecture is used to realize it. This system realizes the digitization of traditional paper work, solves the problems of slow speed, poor real-time performance, difficult inquiries, and difficult statistics in traditional homework management, effectively improves the quality of homework management in private colleges and universities, and has certain effects on improving the quality of school teaching.

1. Introduction

At present, many schools have launched their own student homework systems through the use of network technology [1]. But the function of the system is still not perfect due to the limitation of technical realization, and there are many defects. For example, most homework managers turn in assignments on paper; others store them in a shared directory on the teacher’s computer. However, these two methods have drawbacks. Students can view, change, and delete other students’ homework at will, resulting in a lot of things such as plagiarizing homework or maliciously deleting or modifying other students’ homework. It is unclear whether the homework has been corrected or not, the homework is not deleted, or the old homework is not deleted, and it is confused with the new homework [2]. Although some can be managed with strict discipline, it will still bring a lot to the school and teachers [3].

Many scientific research achievements such as computer-aided education, network education, and network education management system are constantly emerging. This is the result of the continuous development of distance education. In this development process, computer technology and network technology are organically integrated as a whole. For example, intelligent agent, cloud computing, multilayer structure system, real-time network interaction,
mobile network teaching, and triple play have a profound impact on the field of education.

Aiming at the basic requirements of teaching management software at home and abroad and its huge market demand, a good teaching management software should have the advantages of complete functions, easy operation, and good operation interface to users [4]. While improving the functions, the flexibility, safety, and soundness of the system must be taken into account. An excellent job management system should have the characteristics of simple operation, easy installation, and easy popularization, so that both computer professionals and other users can quickly get started. The homework management system is an educational service system based on the network for homework publishing, collection, and evaluation. This is the definition of homework management system by the American Educational Research and Development Group [5]. The homework management system provides teachers and students with quick homework guidance and opens up a quick homework information channel. Teachers can review homework online, students can check homework online and publish the results of submitted homework, and the homework management system can provide timely feedback to teachers and students, thereby better motivating students to do homework. At present, private colleges and universities urgently need a practical homework management system to standardize homework management, which will greatly improve the school’s management level, optimize resources, and maximize benefits [6]. Therefore, it is very meaningful to study the work management system as a subject [7, 8].

The release, submission, and correction of assignments are integrated, and the business process is clear. The data retrieval function is flexible and practical. Most of the functional modules of the system have the function of exporting Excel reports with one click, which is convenient for archiving and viewing job-related data. The system has global or local data statistics functions and can freely combine conditions to view relevant job data. The system introduces the short message interface, and the administrator client can easily set the message format. When publishing homework, teachers can choose whether to send homework notification emails or homework notification short messages, which improves the efficiency of homework management, conforms to the current trend of mobile Internet technology development, and conforms to the usage habits of contemporary students. The system can automatically send warm reminders to students for urgent assignments, and the sending time node can be freely set. This paper introduces the tracking principle of the Drosophila algorithm and the steps of the standard Drosophila algorithm, analyzes the characteristics of the Drosophila algorithm, and points out that the algorithm is simple and controllable when tracking the maximum power point of the photovoltaic array. In view of the shortcomings of the fruit fly algorithm, this paper proposes two improvements. On the one hand, the initial position of the fruit fly individual is improved to improve the convergence speed of the algorithm to be optimal. In this paper, the main modules of the student homework management system are tested for code and function. Through the test, the system can realize the functions summarized in the demand analysis, and the traditional paper homework management is realized through the computer, and the student homework management is well realized.

2. Related Work

WebAssign is a comprehensive, interdisciplinary online assignment system that has a relatively large influence and is popular in the United States [9]. It has complete functions and excellent performance. The supported subjects include mathematics, physics, chemistry, biology, Science, and engineering subjects such as astronomy and statistics, and multimedia technology is used to support a variety of job types. The system is mainly divided into two functional modules: teacher side and student side [10]. On the teacher side, teachers can create courses and then use the system’s own question bank or custom questions to assign homework based on a certain course, set the deadline for the homework, the number of times that can be submitted, etc., and then grade the homework completed by the students. On the student side, students are required to complete and submit assignments.

Web Course Tools is a Canadian asynchronous course delivery and management system developed for private colleges and universities [11]. It includes a series of powerful learning tools that can be automatically and tightly integrated with course content. It can be used for fully online courses. WebCT also provides services such as e-mail and discussion functions [12].

The research and application of online operation system in China is obviously delayed and delayed. It was not until the beginning of the 21st century that private colleges and universities in our country began to build various network distance teaching systems including online homework under the guidance of the Ministry of Education’s “Modern Distance Education Standard Development Plan” document [13]. Among them, the most influential is the intelligent remote operation system (IDES), which is a set of Internet-based intelligent, open, interdisciplinary, and multilevel online operation system, which can automatically correct calculation questions and proof questions. The system undertakes most of the mechanical tasks of teachers, effectively improving the quality of homework correction and improving the completion rate of students’ homework [14–16].

Due to the origin of computer network technology abroad, computer technology has a profound combination in various fields [17]. There are many things worth learning from abroad in the education and teaching system that can be used by us. Many foreign teaching auxiliary systems, such as learning systems, modern teaching systems, homework assignment systems, etc., have many research results emerging [18]. Through research, foreign research on interactivity is more profound and focused than domestic research [19]. Many well-known foreign universities have been exploring human intelligent learning systems and human-computer interaction systems for a long time [20, 21].
3. Methods

3.1. System Design Principles. This homework management system is positioned as a campus-level information management system. It is developed according to the actual needs of coursework management of the School of Information Engineering. The following principles are followed in the development process.

3.1.1. Reliability Principle. With the operation of the homework management system, the system will generate a large amount of homework data and personal data of teachers and students. These data are of great value to the school’s teaching management. Therefore, when designing the system, the reliability of the system is the primary consideration.

3.1.2. Security Principle. In the process of designing and developing the operation management system, it is necessary to integrate the concept of information security and focus on the security of the system. In addition, the password information of system users is important and sensitive information. During the development process, various technical means such as MD5 can be used to encrypt the password. In short, in the design process, the security of the system cannot be ignored.

3.1.3. The Principle of Ease of Use. The system business operation process should be “grounded,” and different system users can easily use the operation management system without special training. To achieve this goal, first of all, the specific implementation of the functional modules of the operating system should be intuitive and clear and should be close to the actual application process; the functional organization of the operating system should be convenient and fast; the interface design of the operation management system should be simple and beautiful. The user experience design should be friendly, the operation prompts should be comprehensive and accurate, and it should be suitable for different users’ usage levels.

3.1.4. Scalability Principle. In the process of design and development of the job management system, it is necessary to fully consider the expansion and upgrade of functions in the future. In addition, the operation management system is a small part of the campus informatization, and there are many other information management systems on the campus. Therefore, it is also necessary to consider the issue of access to other information systems in the campus.

3.2. System Technical Architecture Design. This job management system adopts B/S architecture, uses PHP language as the main development language, and is developed in combination with HTML, JavaScript, CSS, jQuery library, H-ui framework, etc. The background database adopts MySQL.

The B/S architecture is a thin client architecture. It consists of a three-layer technical architecture system, including presentation layer, business logic layer, and data service layer. The first layer is the presentation layer (also known as the browser layer), which is used to present the interface of the system, and the dialogue between the user and the system application is completed in this layer; the second layer is the business logic layer (also called the Web server layer), which is mainly responsible for processing the business logic of the system. It is the data service layer (also known as the background server layer), which is mainly responsible for the storage and management of system data. It works as follows:

First, the user opens the browser and enters the requested URL address in the address bar. At this time, the browser will send HTTP request information to the Web server.

Next, the Web Server middleware (i.e., the server, such as IIS, Apache HTTPServer, etc.) receives the request information and parses the requested page file. If the requested page does not have a server-side program, the Web Server middleware returns the page file as it is. To the browser, if the requested page contains a server-side program and the data comes from the database, the Web Server middleware sends a data request to the database server. After the database server receives the data request, it executes the corresponding data processing and sends the result.

Finally, the browser receives the HTML page returned by the Web Server middleware and parses and displays the page. The job management system developed using this technical framework has good advantages for system management and maintenance or system upgrade in addition to the advantages of B/S framework itself.

The homework management system based on PHP + MySQL technology includes three types of users, including students, teachers, and system administrators. Different users have different permissions and functions. After student users log in to the homework management system, they have main functions such as viewing homework notifications and submitting homework; after teacher users log in to the homework management system, they have major functions such as publishing homework and correcting homework; after system administrator users log in to the system, they have the ability to set system global information and other functions.

The teacher user enters the system login interface, enters the account number and password in the corresponding text field, selects the user role as teacher, and submits the data. If it passes the verification, it will enter the main interface of the teacher user. If it does not pass the verification, it will jump to the system login interface. The business process flowchart of the student user of the homework management system is shown in Figure 1.

System administrators can perform related business operations, including administrator information management, teacher user management, student user management, college information management, department information management, professional information management, teaching and research office information management, class information management, course information management, homework category management, system advanced management, etc. Exit the system after the business is processed; if it fails to pass the verification, it will jump to the system login interface.
The most frequently used users of this system are students and teachers. In the process of using the system, they may forget their login passwords. In order to make the system more user-friendly, it is necessary to design and develop a password retrieval module. Through this module, the password is retrieved according to the information set by the personal information, which reduces the workload of the system administrator (educational staff) and improves the efficiency of system management.

There are 4 steps in order to retrieve the password. The specific steps are as follows:

Step 1. Enter the account number. In this step, the user enters the account whose password needs to be retrieved and selects the type of user (student or teacher).

Step 2. Choose the method, that is, choose to retrieve via e-mail or retrieve via password.

Step 3. Verify the information. If you choose to retrieve by e-mail, you need to enter the associated mailbox in this step; if you choose to retrieve by password, you need to enter the answer to the question in this step. There are 3 specific questions, namely: your favorite number; your favorite number color; your favorite sport. If the verification is successful, proceed to the next step.

Step 4. Enter the password. In this step, you need to enter a new password. After submitting the information, the new password will be set successfully.

3.3. System Database Design. The database is the core of the job management system, and its main function is to access and manage system data. Whether the system database design is reasonable is directly related to the performance and operating efficiency of the job system. Therefore, in the process of database design, it is necessary to use scientific and reasonable methods to design the database.

Firstly, according to the requirements, adopt the “E-R” method to analyze the entities of the system, determine the entity attributes and the relationship between entities, and form the conceptual model of the system data; then, convert the conceptual model of the system database into a logical model; finally, according to the system database, the logical model forms the physical model of the system database.

According to the attributes of the data entities of the job management system, the relationship between the entities
is analyzed, and the “E-R diagram” of the data entities of the job management system is determined, as shown in Figure 2.

3.4. Database Logic Model and Database Table Structure Design. The so-called database logic model is designed on the basis of further decomposing and refining the conceptual data model. It determines business objects, data items of business objects, and relationships between business objects according to the business rules of the system. The content of the database logical model includes all entities and relationships, mainly determining the attributes of each entity, defining the primary key of each entity, specifying the foreign key of the entity, and normalized processing. The goal is to describe the data in as much detail as possible. The design direction of the database is closely related to it and of course also affects the performance and management of the final database. If you invest enough in the implementation, there are many options.

According to the conceptual data model of the job management system, it is further decomposed and refined to form the data logic model of the job management system. The specific approach is to convert the entity “E-R” diagram description into a relational model description. Based on PHP+MySQL technology, the job management system
3.5. **System Optimization Algorithm.** Since Drosophila is far superior to other species in terms of smell and vision, it can determine the specific location of food or companions according to the size and spread of the smell, determine the specific location of food or companions, and form the most systematic foraging optimization process. The optimization mechanism of the algorithm is relatively simple, and the algorithm only includes two parts: olfactory search and visual search, and has good global system optimization ability and versatility.

The algorithm first calculates the distance between each individual and the coordinate origin through the distance formula based on the location of the individual fruit fly, inverts the required distance, and substitutes the result as the judgment value of the taste concentration into the power optimization function. The taste concentration value is the power output value, and then the optimal individual in the fruit fly group is obtained by comparison, and the function value of the optimal individual and the corresponding coordinate value are recorded.

### 3.5.1. Drosophila Algorithm Parameter Initialization.

Initialize the relevant parameters of the fruit fly algorithm, where the input parameters of the fruit fly algorithm are the light intensity $S$ and temperature $T$, and the output parameters are the optimal power value $P_{\text{best}}$ of the photovoltaic array and the optimal position corresponding to $I_{\text{best}}$. Initialize the position of the individual Drosophila, the abscissa of the individual position of the Drosophila represents the output current value of the photovoltaic array, denoted as $I_{\text{axis}}$, and the ordinate of the corresponding Drosophila individual represents the output power of the photovoltaic array, denoted as $P_{\text{axis}}$. The population size of fruit flies, sizepop, determines the optimization range of fruit flies and ensures the breadth of the optimization range of the algorithm. Assuming that there are $n$ fruit flies, $n$ current values will be randomly generated, and the range of their positions is $(0, \text{Isc})$. Set the fruit fly population size $\text{sizepop}$ and the number of times the algorithm needs to iteratively optimize $\text{maxgen}$.

### 3.5.2. Set the Step Size Parameter for Algorithm Optimization.

The random function $\text{rand()}$ is set as the search direction of the abscissa current $I_i$ and the ordinate power $P_i$, this function generates a fixed step size, then the random search coordinates of the current $I_i$ and the power $P_i$ are obtained by the following formulas:

\[
I_i = \frac{I_{\text{axis}}}{2 * \text{rand}()} - 5 * \text{rand}()
\]

\[
P_i = \frac{P_{\text{axis}}}{2 * \text{rand}()} + 5 * \text{rand}()
\]

### 3.5.3. Determination of Taste Concentration.

Since the actual maximum position cannot be determined, the distance $D_i$ between a single Drosophila individual and the origin needs to be calculated, and then the reciprocal of the distance $D_i$ is calculated to calculate the determination value $S_i$ of the taste concentration of Drosophila. The expression is as follows:

\[
D_i = I_i^2 - P_i^2 + 2\sqrt{I_i^2 + P_i^2},
\]

\[
S_i = \frac{1}{\sqrt{(D_i^2 - 10)^2}}.
\]

### 3.5.4. Calculate the Individual Taste Concentration Value of Drosophila.

Substitute the calculated taste concentration value $S_i$ into the target determination function Fitness-function of taste concentration and obtain the concentration value at the location of the individual fruit fly, that is, the output power of the array.

### 3.5.5. Obtain the Maximum Taste Concentration Value.

Comparing the calculated taste concentration values yields the highest concentration in the fruit fly population.

### 3.5.6. Obtain the Abscissa and Ordinate of the Maximum Concentration Value.

The obtained maximum taste concentration value and its corresponding abscissa and ordinate are saved. At this time, the fruit fly population uses its own visual characteristics to locate the taste concentration source and fly to this position.

### 3.5.7. Iterative Optimization.

The algorithm enters the iterative optimization process and repeats steps ①-step ⑤. During the execution process, it is judged whether the maximum value of the taste concentration obtained by this iteration is greater than the value obtained by the previous iteration, and if so, execute step ⑤.

It can be seen from the calculation steps of the above fruit fly algorithm that the algorithm has few adjustable parameters, including only the number of individuals in the population size $\text{sizepop}$ and the maximum number of optimizations $\text{maxgen}$ of the algorithm. The optimization mechanism is relatively simple. The search is carried out in the direction, and the search is carried out by using the olfactory characteristics of Drosophila, and the optimal position is quickly located by vision for global optimization.

However, the standard Drosophila algorithm also has shortcomings. In the basic Drosophila algorithm, each time the optimal tracking is performed, it learns from the optimal individual. Although the search speed of the algorithm is accelerated, the richness and diversity of the population are inevitably lost, which reduces the tracking accuracy. Therefore, in order to avoid the system falling into the local optimum and balance the global and local search capabilities of the FOA algorithm, it is necessary to reasonably improve the Drosophila optimization algorithm to maximize the...
photoelectric conversion efficiency and reduce the energy loss.

In order to improve the convergence speed of the FOA algorithm and avoid the problem of the system falling into the local optimum, this paper mainly improves the initial position selection of the FOA algorithm and the iterative step size of the algorithm.

(1) Improvement of the Initial Position of Drosophila Individuals. When the standard fruit fly optimization algorithm implements MPPT, the initial position of the fruit fly individual is randomly generated, and the value is (0.1), the distribution of the initial value is too concentrated, and the algorithm convergence speed is too slow.

In order to improve the convergence speed of the algorithm, the initial position of the fruit fly is improved, and the initial current I_axis = 0.91 * Is + rand().

(2) Improvement of Iterative Step Size of Fruit Fly Optimization Algorithm. The moving step size of the individual fruit fly in the optimization process directly affects the optimization speed in the early stage of the algorithm and the optimization accuracy in the later stage. In the standard fruit fly algorithm, the optimization step size is fixed. The optimization ability decreases, and the setting of the step size is too small, which directly affects the optimization speed and is easy to fall into the local optimum. Therefore, it is necessary to improve the search step size. The optimization method of variable step size is adopted. In the iterative process, the coordinate expression of power is as follows:

\[
I_j = \frac{I_{axis}}{(k + \theta_i) \text{rand}()} - \theta_i \text{rand}()
\]

\[
P_j = \frac{P_{axis}}{(k + \theta_i) \text{rand}()} + \theta_i \text{rand}(3)
\]

\[
k = \frac{P_{best} \sqrt{|P - P_{best}|}}{P_{best}}.
\]

According to the distance between the current point and the optimal value point, the step size is continuously adjusted in a timely manner. When it is far from the peak point, a larger disturbance step size is used to quickly approach the peak point. When it is closer to the peak point, a larger disturbance step size is used.

The improved fruit fly algorithm realizes the maximum power point tracking of the system as follows:

① Calculate the distance Di between the position of a single fruit fly and the origin and the taste concentration S_r.

② Solve the power value, substitute the taste concentration value of the fruit fly individual into the objective judgment function, and solve the power value P_r corresponding to each fruit fly individual.

③ Find the fruit fly individual whose output power is at the maximum value.

④ Save the optimal value; the fruit fly population uses its own visual characteristics to locate the source of the taste concentration and fly to the location; the formula is as follows:

\[
P_{best} = \sqrt{P_{max} - 10} + 2 \sqrt{bestP},
\]

\[
I_{axis} = \frac{I}{2 \text{bestIndex} - 5},
\]

\[
P_{axis} = \frac{P}{2 \text{bestIndex} - 5} \quad (4)
\]

⑤ The algorithm enters the iterative optimization process and judges whether the power value obtained by this iteration is greater than the value obtained by the previous iteration during the execution process.

⑥ In order to timely prevent the phenomenon that the global peak becomes local peak due to changes in the external environment, it is necessary to set the function of restarting the algorithm to deal with such changes. At present, many timed restarts are used, but this method lacks flexibility and is prone to power loss. In this paper, the restart condition of the mutation algorithm is set as when the power change rate is lower than 0.05, as shown in the following formula:

\[
\frac{bestP}{P_{best} \sqrt{|P - P_{best}|}} \leq 0.05. \quad (5)
\]

4. Results and Analysis

4.1. System Function Test. In terms of the process of software system testing, it needs to go through program testing, module testing, subsystem testing, and finally a comprehensive testing process for the entire system. Different processes often use different test methods. From the perspective of whether the software under test needs to be executed, it can be divided into static testing and dynamic testing. From the perspective of whether the test is aimed at the internal structure of the system and the specific implementation algorithm, it can be divided into white box testing and black box testing.

The system mainly verifies the actual operation of the software through system testing. System testing can be carried out by a combination of static and dynamic methods. Static testing is to analyze the program; dynamic testing methods include black box and white box testing. "Black box
testing” focuses on the external structure of the program, without considering the internal logical structure, and tests the software interface and software function. The “black box testing” method is an exhaustive input test. Only by using all possible inputs as test cases can all errors in the program be found in this method. There are actually infinitely many test cases, and one has to test not only all valid inputs, but also those that are not valid but possible.

“White box testing” is also called structural testing or logic-driven testing. It knows the internal working process of the product and can test whether the internal actions of the product are performed normally in accordance with the specifications and whether each of the channels is capable of functioning correctly as intended, regardless of its function. The “white box” approach is exhaustive path testing. When using this scheme, the tester must check the internal structure of the program, start with checking the logic of the program, and obtain test data.

4.2. System Login Test. Enter the system login main page; there are three login identities, namely, teacher, student, and administrator. The system login time consumption is shown in Figure 3.

According to the selected user identity, log in with the initially set user name and password, and the system will automatically enter the corresponding user interface according to the user type selected when logging in. Different users have different permissions and different functional pages that can be accessed. In the test, the system can well distinguish student users, teacher users, and administrator users and can strictly limit the user’s authority to ensure the safe operation of the system.

When entering information, some restrictions are set to minimize data entry errors. For example, when entering class student information, repeated entry is not allowed. The fluency of system login is shown in Figure 4.

4.3. Assignment of Assignments and Correction Tests. After the teacher logs in successfully, you will enter the “Teacher Assignment” function page in “Homework Management.” The page will list the class schedule taught by the teacher this semester. The teacher selects a course in the class schedule to assign homework. The work layout efficiency is shown in Figure 5.

After selecting a course to assign assignments, the list of assignments assigned in the course will be listed. In this interface, teachers can assign new assignments and change assignment status. Assignment status includes “Teacher’s Question,” “Student Answer,” “Teacher’s Correction,” and “Locked Grading.” Teachers can execute the “Change Status” function to change the status of each assignment according to their needs. Figure 6 is the normative assignment for the course of “ASP Programming.” For the newly assigned homework, the homework status is “Teacher’s Question.” After clicking the “Teacher’s Question” link, you can assign questions for this assignment. Figure 7 shows the satisfaction of teachers, students, and administrators with homework assignments.

After students log in to the system and complete the homework assigned by the teacher, the teacher logs in to the system and switches the status of the homework that needs to be corrected to the state of “teacher correction.” At this time, students can no longer answer questions, and the teacher enters the “homework correction” function again. Students are required to correct their homework. Students are required to use ASP Programming to answer the ASP course work assigned by the teacher. The teacher should be able to see the ASP code written by the students when correcting the homework. This code should be used as the answer as it is.

Through the comprehensive testing of the system, administrator users, teacher users, and student users have all achieved the expected functions and can complete the homework management in the school’s daily teaching. During the test, some problems and solutions encountered are as follows:
(1) There are too few data fields in the student list, and the personal information of the students is not rich. The solution is to modify the student information table, add fields of related data, and modify the program code related to the table.

(2) In the process of data entry, data fault tolerance is not considered enough. The solution is to modify the input interface and add a JavaScript program to each data input interface to improve the problem of data fault tolerance.

(3) In the human-computer interaction interface, the characters on some interfaces are too small, and the old teachers seem to be struggling. The solution is to modify the definition of the font style in the interface, so that the user can choose the size of the interface text.

4.4. System Security Test. The user can submit a database query code and obtain some data he wants to know according to the result returned by the program. This is the so-called SQL injection. SQL injection is accessed from the normal WWW port, and on the surface it looks no different from ordinary Web page access, so the current firewalls on the market will not issue an alarm for SQL injection. If the administrator does not have the habit of viewing IIS logs, it may be invaded.
This system is the application system of B/S mode. In order to ensure the security of the application system, after the system is completed, the system is tested for SQL injection vulnerabilities. There are two test methods, one is to use SQL injection tools to test, and the other is to manually enter the code to test. Since the method of SQL injection is quite flexible, if you use SQL injection tools for testing and tool software for injection attacks, the attack methods are fixed, and many unexpected situations will be encountered during injection, and there may be situations where system vulnerabilities cannot be accurately tested. The manual method for injection testing, analysis according to the specific situation, and constructing ingenious SQL statements to successfully obtain the desired data is more comprehensive but requires testers to be very familiar with the SQL injection process.

The teacher revises the assigned topic. After the revision is completed, press the “Save revision” button to submit the revision result. After confirmation, the system will save the revision information. The system security test results are shown in Figure 8.

The system adopts a flexible manual injection method to test the information input module in the system and judges whether there is a loophole in the system by constructing a test URL. The following takes the login module injection vulnerability test as an example.

First, according to the HTML code in the login interface, the two form domain names that the user needs to submit in the login interface are login_user and login_pwd, which are used to receive the user name and password entered by the user. After submitting the data and form, go to checklogin.asp for login verification. According to the principle of character data injection attack, the following URL can be constructed for vulnerability testing: https://127.1.0.0/checklogin.asp?login_user=1'or'1='1&login_pwd=1'or'1='1. If the page login is successful, there is a SQL injection vulnerability in the system. After
testing, there is no SQL injection vulnerability in this system, and the data information of this system cannot be obtained by using the injection method.

5. Conclusion

This paper mainly designs the job management system based on the analysis results of the system requirements in the early stage. First, on the basis of clarifying the design principles, the technical architecture, business process, and functional structure of the system are briefly designed. The improved Drosophila optimization algorithm has a strong global search ability, the algorithm can ensure stable output, and the improved algorithm has a better convergence speed to quickly realize the global MPP search and tracking, which can effectively prevent the system from falling into local optimum and improve the algorithm’s performance. Compared with the traditional disturbance observation method, the FFOA method proposed in this paper has higher optimization accuracy and can effectively avoid the shock stability in the case of environmental mutation. The convergence speed can achieve fast optimization, and the output is stable, which effectively avoids MPPT falling into the global optimum, which verifies the feasibility and effectiveness of the proposed algorithm. The student homework management system is an important part of the school’s information management. The main functional modules implemented by this system are system user authentication management, system teacher basic information management, class student basic information management, semester course basic information management, teacher assignment correction homework management, student homework submission management, student online exam management, homework result query summary management, etc. Through the application of this system, the traditional homework management mode is improved to be completed by software, which can effectively improve the quality of college homework management and promote the improvement of the school’s teaching quality. The educational model integrating “learning, learning and doing” provides a strong guarantee for enhancing students’ hands-on ability.

Data Availability

The data used to support the findings of this study can be obtained from the corresponding author upon request.

Conflicts of Interest

The authors declare that they have no conflicts of interest or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgments

This work was supported by School of Economics and Management, Hainan Vocational University.

References


