

# Psychological Consultation System Based on Intelligent Optimization Algorithm

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**Abstract.** Due to the increasing pressure of social competition, the fierce conflicts of various values during the social transformation, the complex interpersonal relationships, and the continuous and normalized development of the epidemic, etc., the emergence of mental health problems of college students has been exacerbated. And the various psychological symptoms produced in the process of life continue to increase. The mental health problems of college students have a deepening trend, becoming an important social problem. In response to this situation, we must come up with corresponding solutions to effectively guide and control the various adverse effects of college students due to mental health problems. To this end, a psychological consultation system is designed, and colleges and universities can use this system to provide psychological consultation for students. In the system design, the PSO algorithm of the intelligent optimization algorithm is introduced to optimize the system performance, and through the improvement of the performance, it can better provide consulting services for students. Comparing the performance before and after optimization of the algorithm proves the effectiveness of the PSO algorithm in improving the performance. The results of the system satisfaction survey also verify that the system in this paper meets the needs of students for psychological education counseling.

**Keywords.** Intelligent optimization algorithm, college students, psychological consultation system, PSO algorithm, performance improvement

## 1. Introduction

College students are the talent reserve force and successor that the country attaches the most importance to. However, external factors such as academic pressure, life pressure, employment pressure and other external factors have caused some college students' psychological sub-health and even distortions to varying degrees. The various kinds of contradictions and conflicts cited are being paid more and more attention by all parties.

The research on the design of the psychological consultation system based on the intelligent optimization algorithm has attracted the attention of scholars. The purpose is to provide people with consultation suggestions and relieve their mood. Effective data such as the laws of students' psychological problems are obtained, which can be used by the school's psychological counseling center for reference, so as to better prevent and solve the psychological problems of college students [1-2]. Some researchers have found that the ant colony algorithm can improve the response performance of

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psychoeducational counseling, so as to ensure that each functional module of the system can respond in time when the user is using the system [3].

Based on the psychological status survey data (The samples were distributed to 1372 college students, and the 1372 questionnaires were then screened by stratified sampling to screen freshmen, sophomores, and juniors, and the ratio was 1:2:3, that is to say, there were 34 freshmen and 34 seniors. There were 70 students in the second year and 104 in the junior year, with a total of 208 questionnaires. The reason for this ratio is mainly because the higher the grade of students, the more psychological problems they face, so the maximum number of respondents who are in the third grade can make the psychological counseling data more accurate.) and psychological counseling data of college students in the northern Fujian region of China during the epidemic, this paper first proposes an intelligent optimization algorithm, namely the PSO algorithm, analyzes the concept and algorithm model of the PSO algorithm, and introduces the Several psychological counseling techniques for college students are designed, then a psychological counseling system is designed, and the functions of each module of the system are introduced. Finally, the PSO algorithm is used to optimize the system performance, and the students' satisfaction with the system counseling service is investigated to realize the system counseling function.

## 2. Intelligent Optimization Algorithm and College Psychological Counseling Technology

### 2.1. Intelligent Optimization Algorithm

Particle swarm optimization algorithm is one of the intelligent optimization algorithms. For a problem or function to be optimized, we give its feasible solution space, and imagine a certain number of particle swarms with velocity and position variables moving in the feasible solution space [4]. These particles continuously adjust their motion speed by judging their own historical best position and the historical best position of the entire particle swarm, so as to realize intelligent search for the entire feasible solution space. This is similar to the foraging behavior of the entire flock, and eventually all particles may move to the optimal solution position [5].

It is assumed that the position and velocity of the  $i$ -th particle in the  $t$ -th iteration can be denoted as  $S_i^t = (S_{i,0}^t, S_{i,1}^t, \dots, S_{i,F}^t)$  and  $V_i^t = (V_{i,0}^t, V_{i,1}^t, \dots, V_{i,F}^t)$ , respectively. The best position pBest of each particle is denoted as  $P_i^t = (P_{i,0}^t, P_{i,1}^t, \dots, P_{i,F}^t)$ , and the best position gBest of the entire particle group is denoted as  $P_g^t = (P_{g,0}^t, P_{g,1}^t, \dots, P_{g,F}^t)$ .

The specific evolution process of particles is as follows:

$$v_{ij}^{t+1} = w v_{ij}^t + \alpha r_{1j}^t (P_{ij}^t - S_{ij}^t) + \beta r_{2j}^t (P_{gj}^t - S_{ij}^t) \tag{1}$$

$$S_{ij}^{t+1} = S_{ij}^t + v_{ij}^t \tag{2}$$

Among them,  $i$  represents the  $i$ th particle ( $i=0,1,2,..N$ ),  $N$  is the size of the particle swarm,  $j$  represents the dimension of the particle ( $j=0, 1,2,..,F$ ),  $F$  is the particle dimension;  $t$  is the number of iterations,  $\alpha$  and  $\beta$  are learning factors, the former adjusts the distance between the particle itself and the individual extreme value, and the latter

adjusts the distance from the global extreme value;  $r'_{1j}$  and  $r'_{2j}$  represent the randomness of [0,1] number [6].

## 2.2. College Students' Psychological Counseling Technology

(1) Listening technology. When conducting psychological education counseling for college students, the counselor should listen patiently. Its main function is: first, through listening, it is conducive to the establishment of a mutual trust consulting relationship, which reflects the importance of the client and makes him feel the warmth of being cared for. Second, it helps the inquirer to vent his inner distress and help the counselor to treat him. Thirdly, with the help of the visitors' full and thorough remarks, it is helpful for the counselors to discover and excavate their psychological problems and root causes [7-8].

(2) Short answer. Reception means that the counselor uses very short words to express personal views along the topic of the inquirer's narration [9]. It has the following functions: firstly, it can give the inquirer a space and opportunity to sort out and consider the origin of their own thoughts; secondly, it shows that the inquirer is listening carefully to the inquirer's narration, and at the same time, it also motivates him to continue to speak. However, introducing new topics or rushing to express opinions and opinions is not acceptable [10-11].

(3) Silence. During the consultation process, both the inquirer and the inquirer will induce silence, but the inquirer should intentionally arouse and seek to continue the topic [12]. The long and uncontrollable silence is often caused by the inquiring party's distraction and disengagement from the other party's topic, which will make the inquirer feel cramped and bewildered and terminate the conversation, so it should be avoided as much as possible [13].

## 3. System Design

Figure 1 shows the functional blocks of the psychoeducational counseling system. The functions of each module are described as follows:

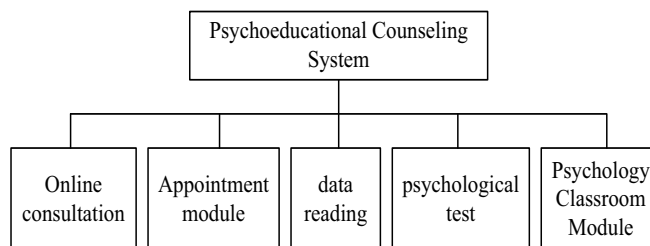


Figure 1. Psychological consultation system module.

### 3.1. Online Consultation

The online consultation requirement is the most important part of the terminal system. Through the mobile terminal, the interaction with the psychological consultants in the psychological consultation center and the integration of online communication and

communication can be realized. Multiple students use mobile terminals to conduct psychological counseling inquiries, and multiple psychological counselors respond directly and quickly through the server-side content management system, completing a very efficient information exchange, and there is no objective factor affecting the communication. At the same time, you can also leave a question message in an offline form, and directly leave your question on the message board. After waiting for a few working days to be batched, the system will automatically return the reply information to the inquirer.

### *3.2. Reservation Module*

The requirement of the appointment function is the most important requirement of the system, and the most effective consultation method is face-to-face consultation. In order to make the tutoring work on a regular basis, there should be an appointment function, so that students can apply in advance, and then have a face-to-face consultation with the consultant at the time of their choice. This module can not only directly query the information of the relevant psychological consultants when you need it through the software interface, but also query the timetable that can be reserved, and submit the application for consultation corresponding to the consultant. At the same time, the function of this module can help students Manage or check application status when the application is not approved.

### *3.3. Data Reading*

The demand for data reading function, as an auxiliary function, for some psychological problems that college students have already asked with the psychological counseling center, especially some common problems can be directly sorted into file form after statistics, which can be directly read by college students through this function. If the current college students' own psychological problems happen to be described and answered in detail in the data reading, it will bring great convenience to the users, and can realize the self-solving psychological problems of the current users. Usually, you can directly use the keywords you care about to search for the relevant information about the questions you want to ask. You can also update the content of your materials in real time through management to determine the latest version of the content of all the materials, so as to facilitate the effectiveness of the materials.

### *3.4. Psychological Test*

The psychological test function is an auxiliary function requirement of the system. Based on the psychological counseling center's sorting out of the psychological counseling materials of the students in the corresponding colleges and universities, it publishes the test papers for the reasonable and scientific psychological conditions of the students in the current school. Realize that students can understand their own psychological state through the test, especially those students who do not actively participate in psychological counseling. After filling in the test, they can directly get the result within a few seconds, and suggest whether they need to go to the psychological counseling center for consultation, or do psychological counseling. At the same time, these test questions are regularly updated and changed through the

school's psychological counseling center, so as to be more suitable for the psychological detection of students of every age and more scientific.

### 3.5. Psychological Classroom Module

The psychological classroom module mainly completes the publicity and popularization of mental health knowledge. Many psychological knowledge is relatively abstract and difficult to understand, and students cannot grasp and apply it correctly. This section of psychology classroom can make use of computer multimedia technology to concretize and visualize complex and abstract knowledge through dynamic web design elements.

## 4. System Testing and Implementation

### 4.1. Performance Test

The system designed in this paper should have strong concurrency, responsiveness, compatibility, security and other performance in the consultation process. For the current system, the PSO algorithm can be used to optimize the system performance. Therefore, comparing the performance of the algorithm before and after optimization can verify whether the algorithm can improve the system performance. If the system performance is improved, the intelligent optimization algorithm can also be used for reference in future research to improve the system performance. The performance test results are shown in Figure 2. Compared with the performance before optimization, the performance after optimization has been significantly improved, indicating that the PSO algorithm is suitable for the performance optimization of the psychological consultation system.

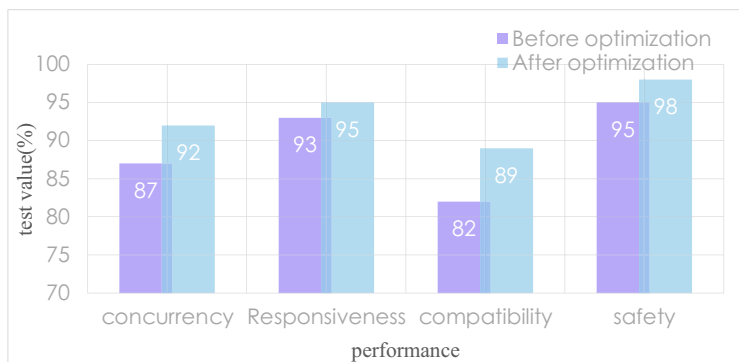


Figure 2. Performance optimization test results.

### 4.2. Implementation of the Consultation Process

In the actual process of counseling, we not only need to carry out various tests to judge the mental health level of the students seeking help, but also conduct interviews with the visitors through verbal and non-verbal forms to achieve the effect of the counseling and further accurately grasp the students' mental health. In this process, consultants

rely more on their own consultation skills and professional background, and can make decisions according to changes in the situation at the consultation site. Quick and accurate response to ensure the smooth progress of the consultation.

In the Internet-based network environment, consultants must communicate face-to-face with students. In the case of limited network bandwidth, efficient audio and video file encoding tools must be used to ensure the best results and make full use of the bandwidth as much as possible., RealServer itself provides good bandwidth utilization and streaming service functions. With the help of professional video encoding software HELIXPRODUCER tool, remote audio and video broadcasting can be realized, so that students can see the consultant without leaving home, and quickly enter the consultation state.

### 4.3. Student Satisfaction Survey

The system is applied to the psychological education counseling of college students, and the students' satisfaction with the system is investigated after they use it, so as to feedback whether the system designed in this paper meets the needs of counseling. The results are shown in Table 1. A total of 79.11% of the students recognized the function of the system and were satisfied after using the system. 12.52% of the students expressed that the system consulting service was average, and 8.57% of the students were dissatisfied after using the system. Through interviews with dissatisfied students to understand the reasons for their dissatisfaction with the system, it was found that they believed that face-to-face consultation through video still could not overcome the barriers of communicating with strangers during the consultation process. It may be better if the system can switch the voice consultation mode. Another is that the report obtained after completing the psychological test does not indicate the level of their mental health, so that they do not know what level their mental health is at. In response to these two main problems, the system was improved, and the video-voice switching function and the psychological evaluation rating display function were added through the system settings. It can be seen that the proportion of students who recognize the system's counseling services is relatively large, so the system in this paper meets the needs of psychological education counseling.

**Table 1.** Satisfaction results.

	<b>Proportion (%)</b>
Very satisfied	54.05
Quite satisfied	24.86
Generally	12.52
Relatively dissatisfied	6.13
Very dissatisfied	2.44

## 5. Conclusion

Mental health problems have become a serious threat to students' study and life, and the construction of college students' mental health has become an urgent issue that needs to be solved. Therefore, in order to solve the problem of college students' psychological education, this paper designs a psychological consultation system based on intelligent optimization algorithm, optimizes the performance of the system such as

responsiveness and concurrency through the PSO algorithm, and realizes the system operation in the network environment. Through the use of the satisfaction survey, it is found that most students are satisfied with the system's consulting services after using the consulting system and verify the reliability of the system. Therefore, the psychological education consulting system can be implemented in colleges and universities to prevent serious psychological problems in college students.

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