



Personalized Scheduling of Distributed Online Educational Resources Based on Simulated Annealing Genetic Algorithm

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Abstract. The arrival of the information age has accelerated the development of information education, and distributed online education resources have increased exponentially. However, due to the low level of scheduling service, the application effect of education resources is poor, which hinders the follow-up development of information education. A personalized scheduling method of distributed online education resources based on simulated annealing genetic algorithm is proposed. The membership relationship between knowledge points and educational resources is calculated using fuzzy logic method, and the corresponding educational resource model is constructed. Based on this, the purpose and key problems of personalized scheduling of educational resources are analyzed, and the objective function of personalized scheduling of distributed online educational resources is constructed. The objective function is solved based on simulated annealing genetic algorithm, Obtain the final personalized scheduling scheme of distributed online education resources, and realize the personalized scheduling of distributed online education resources. Experimental data shows that after the proposed method is applied, the minimum response time of distributed online education resource scheduling is 6s, and the maximum precision of distributed online education resource scheduling is 96%, which fully confirms that the proposed method has better application performance.

Keywords: Distributed · Individualization · Dispatch · Online education resources · Simulated annealing genetic algorithm

1 Introduction

With the rapid development of information science and technology, mankind has entered the information age. The State Council, based on China's basic national conditions, put forward the overall idea of informatization development. Information resources and talents, information technology application, information network, information technology industry, and information policies, laws and regulations are important elements of the national information system. However, from the perspective of the development of an

information industry, information resources are the core, while information networks are the foundation, the use of information resources and the application of information technology are the purpose, and the information technology industry, information talents, and information policies, regulations and standards are its guarantee. One of the most basic components of the education system is information. The reform and development of education requires the informatization of education to be promoted by the comprehensive and in-depth use of modern information in the entire educational field. The inevitable result of educational informatization is to form a new form of education, that is, information-based education [1]. Informational education is characterized by the globalization of educational resources, the multimedia of course materials, the autonomy of learning, the personalization of teaching, the cooperation of activities, the virtualization of the environment and the automation of management, among which educational resources are the core of all applications. At the same time, educational resources are also the top priority of educational informatization construction, which plays an extremely important role in improving the quality of education and teaching and promoting the development of education.

At present, the three characteristics of educational resources, namely, heterogeneity, dynamics and autonomy, make educational resources have many problems in sharing and collaboration, which greatly affects the efficiency of users in obtaining information related to teaching resources. However, the ultimate goal of the grid is to realize the sharing and distributed collaboration of a large number of teaching resources distributed in various geographical regions. Grid refers to the connection of all major clusters, supercomputers, database servers, large-scale storage systems and other geographically dispersed special instruments and equipment, as well as all resources including personal computers (in this case, computing, software, information, storage, communication, knowledge and other related resources) to be used as a completely unified resource. A parallel distributed computing platform with large capacity, high performance and high speed transmission is the inevitable result of the development of grid technology to a certain extent. Grid technology mainly emphasizes the realization of comprehensive sharing of resources and application services. In order to solve the problems in teaching resource sharing and teaching resource distribution services, a scheduling strategy for teaching resources is proposed. It is mainly aimed at the scheduling of distributed online teaching resources, which can improve the application efficiency and effect of educational resources and provide assistance for the follow-up development of online education [2].

The construction of educational resources is a systematic project. The design, development, management, application and evaluation of educational resources are interlinked and interdependent steps in the resource construction project. After the resources are designed and developed, they need to be delivered to the resource users in a timely and effective manner to serve students, teachers and other educators, so as to reflect the ultimate purpose and value of educational resources. The purposefulness, dynamics, timeliness and individuation of educational resource construction fully reflect the significance of resource distribution in resource construction. The long-term and stable continuous updating and maintenance is the guarantee of the lasting vitality of educational resources. The effective solution to the problems existing in the construction plays a very important

role in promoting the construction of educational resources, promoting the development of educational informatization, and realizing the balanced and leapfrog development of education. The new resource distribution service system will bring great application value. As far as the existing research results are concerned, the more frequently used scheduling methods are the educational resource scheduling method based on genetic algorithm and the educational resource scheduling method based on P2P technology. The above two methods have the problems of low bandwidth utilization, long response time and poor scalability, which cannot meet the development needs of today's education field. Therefore, a personalized scheduling method of distributed online education resources based on simulated annealing genetic algorithm is proposed. By establishing a user base model and interest model, users can be segmented and classified, providing personalized recommendation services, recommending content, products or services that meet their interests and preferences, and improving user satisfaction and experience. Using fuzzy logic method, calculate the membership relationship between knowledge points and distributed online education resources, and construct a distributed online education resource model. This paper describes the personalized scheduling problem of distributed online education resources, constructs the personalized scheduling objective function of distributed online education resources, solves the objective function based on Simulated annealing genetic algorithm, and obtains the personalized scheduling scheme of distributed online education resources, which effectively shortens the scheduling response time and improves the scheduling accuracy.

2 Research on Personalized Scheduling of Online Education Resources

2.1 Construction of User Base Model and Interest Model

In order to improve the accuracy of educational resource scheduling, the first step is to build a user base model and interest model, which will lay a solid foundation for subsequent research.

The establishment of user model is not only conducive to personalized resource scheduling, but also conducive to the construction of new resources. The role of the user model on the system is mainly reflected in the following three aspects:

According to the user model and resource model, matching can realize personalized resource scheduling based on content;

Clustering user interest groups according to user model to achieve collaborative resource scheduling for users;

When the interests of some users with higher concerns in the user interest model do not match the corresponding resources, the headquarters resource development center can develop new resources according to these users' interests, which is conducive to better understanding the needs of resource users and improving the pertinence and practicality of the developed resources.

The user base model is mainly described in terms of school name, school type, characteristic theme, natural situation, informatization level, etc. The natural conditions include the economic development level of the school location, the school area, the

number of classes, the number of students, the number of teachers, the composition of teachers' qualifications and so on; The informatization level includes teachers' information literacy level, students' information literacy level, campus network construction, computer room configuration, teacher machine configuration, etc. The detailed user basic information questionnaire is shown in Table 1.

Table 1. Basic User Information Questionnaire

Project	Range	Value Description
School name	-	Full name
Type of school	A	Primary school
	B	Junior middle school
	C	High school
Featured activities	A	Music
	B	Calligraphy and painting
	C	Performance
	D	Science and technology
	E	Sports
	F	Other
School area	A	>40000 m ²
	B	10000–4000 m ²
	C	<10000 m ²
Number of students	A	>2500 people
	B	1000–2500 persons
	C	<1000 persons
Number of teachers	A	>150 persons
	B	60–150 persons
	C	<60 persons
Configuration of machine room	A	Excellent
	B	Secondary
	C	Low or none
Campus network construction	A	With LAN and Internet access
	B	There is a LAN, but no access to the Internet
	C	No network
Information literacy level of students	A	Most students can operate computers skillfully
	B	Some students can operate computer skillfully
	C	A few students can operate computers skillfully
Teachers' information literacy level	A	Most teachers have received information technology training
	B	Some teachers have received information technology training
	C	A few teachers have received information technology training

The user interest model should have strong adaptability and robustness. When describing the user interest model, the following two factors should be considered:

First, users with different background knowledge of the content represented by a keyword will have different understandings, such as “firewall”. Users with computer knowledge background will understand it as a kind of software; Users with architectural knowledge background will understand it as a wall for fire prevention. Therefore, when modeling users, the user’s background information needs to be considered [3].

Second, users’ interests will change over time. Some topics that users were originally interested in will be gradually forgotten, and new interest topics will gradually emerge. This gradual process of user interest is also called “interest drift”. The existence of interest drift makes the user model should also change, otherwise the user model will not reflect the user’s interest well. Therefore, the forgetting and updating mechanism of user interest should be considered in the design of user modeling.

In order to reflect user interest more realistically, user interest model is represented by vector space model based on background and temporal. That is to say, disciplines and learning stages are introduced into the model as background constraints, and interest weight functions based on temporal changes are introduced into vector space $\omega_n(\bar{T}_n)$ to calculate the attenuation and update of user interest weight.

At a certain moment t , the user interest model expression is

$$U = \{S, G, K\} \tag{1}$$

In formula (1), U represents the user interest model; S refers to the collection of disciplines (such as mathematics, Chinese, biology, etc.); G refers to the collection of learning stages (primary school one year, primary school two years, primary school three years, etc.); K represents the user interest keyword vector space, recorded as $K = \{(k_1, \omega_1(\bar{T}_1)), \dots, (k_n, \omega_n(\bar{T}_n))\}$, where, k_n refers to the n keywords describing interest, \bar{T}_n represents a keyword k_n time set of each submission, $\omega_n(\bar{T}_n)$ represents a keyword k_n the time related weight function of.

The attenuation and update of user interest are calculated based on the time window mechanism, that is, at a certain time window Δt the keyword is submitted, the weight will be increased; Otherwise, the weight is attenuated.

Assumptions are as follows:

1. Each time window Δt inner keywords k_n for each submission, the interest weight will be increased by units a ;
2. Each time window Δt inner keywords k_n if not submitted, the interest weight attenuation unit b ;

So, at some point t , keyword k_n the interest weight function of is expressed as:

$$\omega_n(\bar{T}_n) = \begin{cases} \sum (f(t_{n1} + (i - 1) \cdot \Delta t) \cdot a - c \cdot b) \omega_n(\bar{T}_n) > 0 \\ 0 & \omega_n(\bar{T}_n) \leq 0 \end{cases} \tag{2}$$

In formula (2), $f(t_{n1}, t)$ means $[t_{n1}, t]$ time window within time period Δt number of; $f(t_{n1} + (i - 1) \cdot \Delta t)$ means that $[t_{n1} + (i - 1) \cdot \Delta t, t_{n1} + i \cdot \Delta t]$ number of keywords submitted in the time window; c represents a constant, and the value is 0 or 1. The value

rule is as follows:

$$c = \begin{cases} 0 & f(t_{n1} + (i - 1) \cdot \Delta t) > 0 \\ 1 & f(t_{n1} + (i - 1) \cdot \Delta t) \leq 0 \end{cases} \quad (3)$$

The user interest model is described in tree structure as shown in Fig. 1.

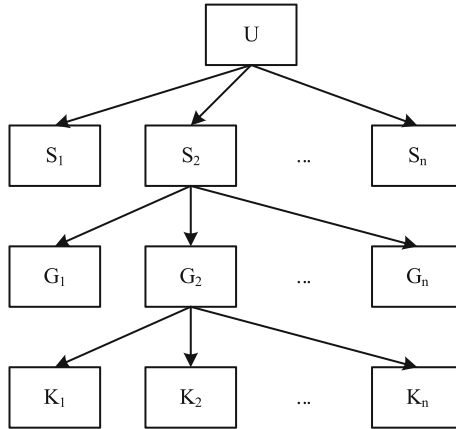


Fig. 1. User interest tree

The above process completed the construction of user base model and interest model, providing support for the subsequent construction of online education resource model.

2.2 Construction of Online Education Resource Model

How to accurately model educational resources is the key to realize personalized scheduling of educational resources. In order to speed up the development and utilization of high-quality educational resources and realize the sharing and benefit of educational resources in many ways, it is necessary to accurately describe and model educational resources [4]. In order to realize the recommendation service of educational resources based on learners’ personality and meet learners’ personalized learning needs, the primary task is to reasonably classify, label and manage educational resources, so as to realize the integration and clustering reconstruction of educational resources. In this study, knowledge points are used as a link to annotate educational resources at the semantic level, and fuzzy logic method is used to calculate the membership relationship between knowledge points and educational resources, and the corresponding educational resource model is constructed.

In the practical application of distributed online education resources, a resource often belongs to multiple categories at the same time in different degrees. For example, a movie may belong to comedy, love, adventure and other types at the same time, and a learning resource may belong to multiple knowledge point categories at the same time. Therefore, this paper uses fuzzy set theory to model educational resources, that is, a

resource will belong to multiple knowledge points in varying degrees. In the process of educational resource scheduling, educational resources correspond to projects to be scheduled I_j the knowledge points associated with educational resources correspond to categories x_k , thus, you can use $\mu_{x_k}(I_j)$ represents a resource I_j belongs to knowledge points x_k degree, and the association between resources and knowledge points uses two-dimensional vector $(x_k, \mu_{x_k}(I_j))$ express. Common forms of membership function mainly include triangle, trapezoid, Gaussian function, exponential function, etc. The membership function defined in this paper $\mu_{x_k}(I_j)$ the calculation formula of is based on the form of exponential function, and the expression is

$$\mu_{x_k}(I_j) = \begin{cases} (\frac{1}{2})^{\lambda|L_j|(r_k-1)} & 1 \leq r_k \leq |L_j| \\ 0 & r_k > |L_j| \end{cases} \tag{4}$$

In formula (4), λ indicates the adjustment parameters; $|L_j|$ represents the relationship between resources and I_j number of associated knowledge points; r_k represents knowledge points x_k in all resources I_j the arrangement position of the associated knowledge points.

It should be noted that, $\mu_{x_k}(I_j)$ meet the following conditions: the higher the degree of association between resources and categories, the greater the corresponding degree of membership; Otherwise, the degree of membership is smaller; If the resource is not associated with a category, the corresponding membership is 0.

The education resource model is defined as:

$$RM = (RI, KS, RS, DD, PT, OI) \tag{5}$$

In formula (5), RM represents the educational resource model; RI represents the basic information of educational resources, mainly including the name, capacity, author, upload time, storage path, etc. of the resources; RS represents the style type of educational resources, which is defined by $\{(r_s, r_t)\}$ composition. Among them, r_s refers to the media type of educational resources, r_t represents the content form of educational resources; KS refers to the set of knowledge points associated with the educational resource, including the knowledge points themselves and their association degree, which is represented by membership; DD , PT and OI respectively represents the difficulty coefficient, present time and target content of educational resources. Among them, the difficulty coefficient is the degree of difficulty in learning and mastering the educational resources; The present time is the approximate time needed to learn the educational resources: the target content indicates the learning objectives contained in the educational resources. The learning objectives in the target content, which have been described in the previous definition, mainly include knowledge points and the learning level requirements for knowledge points, and are divided into three levels, namely memory learning, understanding learning and extended learning.

The online education resource model constructed breaks through the relationship between resources and knowledge points in the previous education resource model. The fuzzy logic method is introduced to express the relationship between resources and knowledge points with membership, which more truly depicts the relationship between resources and knowledge points.

2.3 Personalized Scheduling Problem Description of Online Education Resources

Based on the user model and online education resource model constructed above, the purpose and key issues of personalized scheduling of education resources are analyzed, and the objective function of personalized scheduling of distributed online education resources is constructed to provide a basis for the determination of the final personalized scheduling scheme of education resources[5].

Scheduling matching problems are common in all walks of life, such as the famous traveling salesman problem, secondary allocation problem, sequence scheduling problem, vehicle routing problem, job shop scheduling problem, grid resource scheduling, weapon target allocation problem, and so on[6]. The personalized scheduling of distributed online education resources is mainly realized by the scheduling server, and its specific structure is shown in Fig. 2.

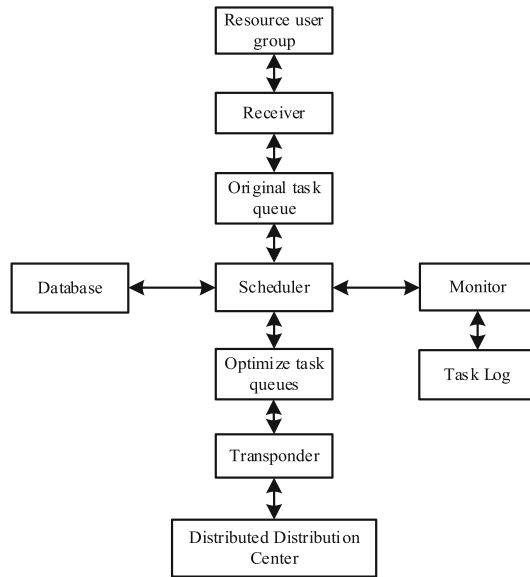


Fig. 2. Structure diagram of dispatching server

As shown in Fig. 2, the scheduling server consists of receiver, scheduler, repeater, monitor, original task queue, optimization task queue, task log, and database. The specific components are as follows:

Receiver: It is responsible for receiving requests from resource users, collecting information about resource identification requested by users, connection speed between users and distribution centers, and forming the original task queue.

Scheduler: According to the original task queue and the corresponding information in the database, such as resource size, distribution center load, etc., tasks are re queued to form an optimized task queue according to the allocation scheme optimized by some algorithm.

Forwarder: assign the corresponding distribution center to provide services for user tasks according to the distribution center allocation scheme in the optimization task queue.

Monitor: According to the task log information, fire the task scheduler to determine whether to adjust the scheduling policy and re optimize the task queue.

From a macro perspective, the scheduling server balances the tasks of each resource distribution center, tries to avoid excessive requests for a single center, and makes the system load tend to balance. At the micro level, the reasonable allocation scheme between the distribution center and resource users is obtained as far as possible through the optimization algorithm to optimize the system performance. An early warning mechanism is set up for the prevention of abnormal problems, which can monitor the health of the system in real time during the system operation, and automatically trigger the emergency processing program to protect the normal operation of the system when abnormal conditions occur.

At the same time, scheduling server load balancing is also crucial. The flow chart of load balancing is shown in Fig. 3.

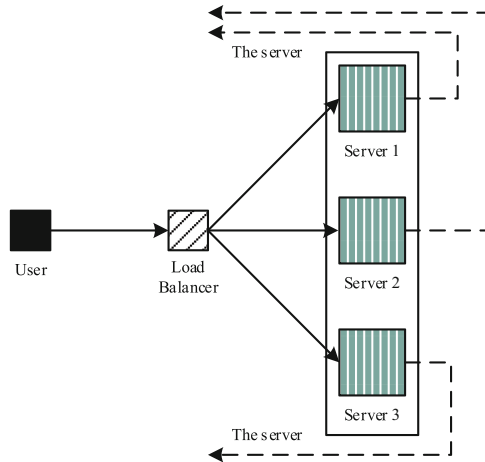


Fig. 3. Load Balancing Flow Chart

As shown in Fig. 3, the general process of load balancing is: when a user’s request arrives, the load balancer selects the most appropriate server in the cluster according to the status information of each server in the cluster, using the given load balancing policy, and redirects the request to that server, which then provides services for the user [7]. Load balancing strategy is the core part of load balancing.

Assume there is m distribution center servers C_1, C_2, \dots, C_m , for n users U_1, U_2, \dots, U_n provide distributed online education resource distribution services. Section j centers C_j the maximum number of connected users is MAX_{C_j} , section i users U_i the download task is M_{U_i} , Task M_{U_i} the physical size of is SM_{U_i} , completed on TM_{U_i} , user U_i the maximum number of connected distribution centers is MAX_{U_i} , user U_i and center C_j download speed between $V_{U_i-C_j}$.

Constraints: The maximum number of connected users in the distribution center is MAX_{C_j} , upper limit of connecting distribution center with users MAX_{U_i} . The way of optimizing scheduling in the system mainly considers downloading tasks M_{U_i} select the distribution center of. The purpose of optimization is to minimize the completion time of all download tasks.

Then the objective function of personalized scheduling of distributed online education resources is expressed as:

$$\left\{ \begin{array}{l} \min E = \sum_{i=1}^n TM_{U_i} \\ TM_{U_i} = \frac{SM_{U_i}}{\sum_{j=1}^m V_{U_i-C_j} \cdot x_{U_i-C_j}} \\ \sum_{i=1}^n x_{U_i-C_j} \leq MAX_{C_j} \\ \sum_{j=1}^m x_{U_i-C_j} \leq MAX_{U_i} \\ x_{U_i-C_j} = \begin{cases} 1 & C_j \rightarrow U_i \\ 0 & other \end{cases} \end{array} \right. \quad (6)$$

In formula (6), E represents the personalized scheduling objective function of distributed online education resources; $x_{U_i-C_j}$ represents the real-time quantity of educational resource scheduling; $C_j \rightarrow U_i$ means C_j by U_i provide services.

From the above mathematical model, it can be seen that this is a typical multi-objective optimization problem. The total objective function is determined by each sub objective function, and each sub objective may conflict. The optimization of one sub objective function is often accompanied by the degradation of other sub objective functions.

2.4 Determination of Personalized Scheduling Scheme of Educational Resources

Based on the objective function of personalized scheduling of distributed online education resources determined above, the objective function is solved based on simulated annealing genetic algorithm [8–10] to obtain the final personalized scheduling scheme of distributed online education resources.

Simulated annealing algorithm is a random optimization algorithm. Its starting point is based on the similarity between the cooling process of high-temperature solid materials in physics (also called annealing) and the solving process of general combinatorial optimization problems. Therefore, simulated annealing algorithm is often used to solve combinatorial optimization problems. The basic steps of the simulated annealing algorithm are:

Step 1: Determine the initial temperature T_0 ;

Step 2: Given the cooling function, the expression is

$$T_{k+1} = \nu T_k \quad (7)$$

In formula (7), T_{k+1} and T_k respectively represent the time $k + 1$ and k temperature value of; ν represents the cooling coefficient.

Step 3: When the temperature is close to 0, the algorithm is terminated.

Genetic algorithm is a stochastic optimization algorithm based on the mechanism of “survival of the fittest” to solve combinatorial optimization problems. Genetic algorithm uses chromosome to express the solved problem[11]. Through the continuous evolution of population replication, crossover and mutation operations, the best individual is the optimal solution of the problem. After nearly half a century of development, genetic algorithm has developed into one of the most widely used algorithms in the field of combinatorial optimization. The basic steps of genetic algorithm are:

Step 1: Randomly generate the initial population $P(0)$;

Step 2: Individual fitness evaluation;

Step 3: If the fitness meets the design requirements, output the results; if not, continue the following steps;

Step 4: Select, cross and mutate;

Step 5: Jump back to Step 2 until the maximum number of iterations is reached.

Both simulated annealing algorithm and genetic algorithm have certain defects, and can not obtain the best personalized scheduling scheme of distributed online education resources, so they are effectively integrated - simulated annealing genetic algorithm [12, 13]. Simulated annealing genetic algorithm combines the characteristics of simulated annealing algorithm and genetic algorithm in optimization operation, principle and other aspects, making the search behavior in the optimization process more perfect, enhancing the ability of global search and local search, and effectively controlling the emergence of “premature” phenomenon, which can theoretically better solve the problem of educational resource scheduling.

The process of obtaining personalized scheduling scheme of distributed online education resources based on simulated annealing genetic algorithm is as follows:

(1) Encoding and decoding:

The algorithm uses operation based coding, and uses constraints to generate initial chromosomes. The decoding process is to first convert the chromosome into an ordered operation table, and then process each operation one by one according to the constraints to generate a scheduling scheme.

(2) Objective function:

The objective function is to minimize the scheduling completion time, which means that the scheduling scheme is better in this evaluation index. Its mathematical expression is as follows:

$$f = \min E = \sum_{i=1}^n TM_{U_i} \quad (8)$$

(3) Genetic operator operation:

a. Select operator. The elitist retention strategy and proportional selection method can make individuals with high adaptability inherit with greater probability, thus improving the efficiency of the algorithm.

b. Crossing operator. By improving the conventional crossover operation and designing a simple sequential selection method based on complementary sets, crossover operation has the ability of rapid evolution.

c. Mutation operator. Using the exchange operation, the genes at two different places in the chromosome are exchanged randomly.

(4) Algorithm parameter setting:

Population size, generally 10–200; Crossover probability P_c and probability of variation P_m ; Termination algebra, generally 50–200; The initial temperature is determined by the following formula, the expression is

$$t_0 = -\frac{c_w - c_b}{\ln P_r} \quad (9)$$

In formula (9), t_0 the initial temperature; c_w and c_b respectively represent the most adaptive and least adaptive target values of the initial population; P_r represents the relative acceptance probability.

Attenuation function, as shown in Formula (7); The state receiving function refers to the passing probability $\min\left(1, \exp\left(-\frac{\Delta}{T_k}\right)\right)$ accept the new value.

The above process determines the personalized scheduling scheme of distributed online education resources. The implementation of the determined scheme can realize the personalized scheduling of distributed online education resources and provide assistance for the subsequent application of education resources.

3 Experiment and Result Analysis

3.1 Experiment Preparation Stage

In this experiment, three distribution centers provide 10 users with personalized scheduling services for distributed online educational resources as an example to test the application performance of the proposed method. The servers are as follows: the three servers are respectively represented as: C_1 , C_2 and C_3 ; The server C_1 the maximum number of connections for users is 5, and the server C_2 the maximum number of connections for users is 8, and the server C_3 the maximum number of connections for users is 7; The 10 users are represented as: U_1 , U_2 , U_3 , U_4 , U_5 , U_6 , U_7 , U_8 , U_9 , U_{10} ; Assume that the maximum number of server connections for 10 users is 1, and the same resource data package is downloaded. The file size is 5000K, and the download speed between each user and the server is limited to 100k/s. The specific data is shown in Table 2.

The personalized scheduling operation interface of distributed online education resources is shown in Fig. 4.

The above process has completed the experimental preparation and provided some convenience for the subsequent experiments.

3.2 Analysis of Experimental Results

Based on the contents of the above experiment preparation stage, the comparison experiment of personalized scheduling of distributed online education resources is carried

Table 2. Download speed between server and user/k/s

	C_1	C_2	C_3
U_1	300	500	400
U_2	300	900	500
U_3	500	300	800
U_4	700	600	200
U_5	100	800	500
U_6	100	100	900
U_7	800	800	300
U_8	400	500	900
U_9	200	700	700
U_{10}	800	100	300

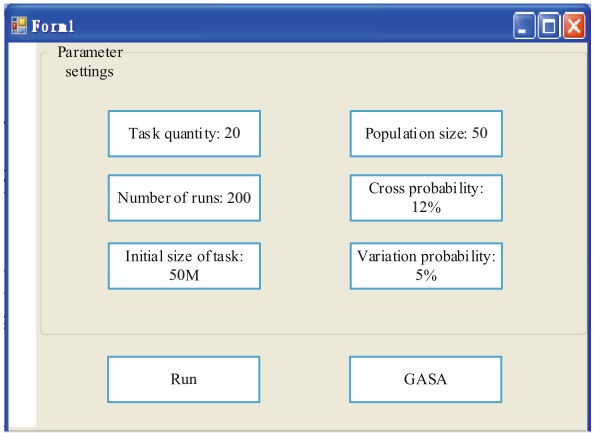


Fig. 4. Example of distributed online education resources personalized scheduling operation interface

out with the educational resource scheduling method based on genetic algorithm and the educational resource scheduling method based on P2P technology as comparison method 1 and comparison method 2, The application effect of the proposed method is visually displayed through the response time of distributed online education resource scheduling and the scheduling accuracy of distributed online education resources.

The response time of distributed online education resource scheduling obtained through experiments is shown in Fig. 5.

As shown in the data in Fig. 5, under different user backgrounds, the response time of distributed online education resource scheduling obtained after the application of the proposed method is less than that of comparison methods 1 and 2, and the minimum value reaches 6s.

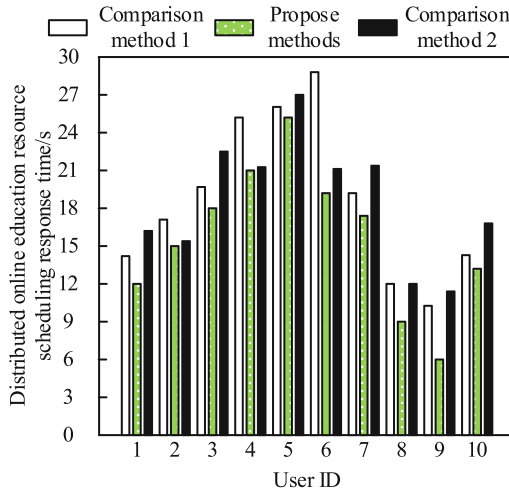


Fig. 5. Schematic diagram of response time of distributed online education resource scheduling

The scheduling accuracy of distributed online education resources obtained through experiments is shown in Fig. 6.

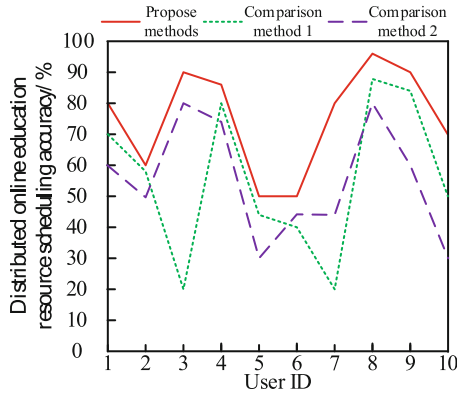


Fig. 6. Schematic diagram of scheduling accuracy of distributed online education resources

As shown in the data in Fig. 6, under different user backgrounds, the scheduling accuracy of distributed online education resources obtained after the application of the proposed method is greater than that of comparison methods 1 and 2, and the maximum value reaches 96%.

Further validate the performance of distributed online education resource scheduling, using throughput as an evaluation indicator. The higher the throughput, the more efficient the resource scheduling can handle a large number of requests or tasks.

The throughput of distributed online education resource scheduling obtained through experiments is shown in Table 3.

Table 3. Distributed Online Education Resource Scheduling Throughput/MB/s

Number of educational resources/MB	Propose methods	Comparison method 1	Comparison method 2
200	189	179	152
400	391	357	342
600	573	541	420
800	779	749	725
1000	985	974	955

According to Table 3, as the number of educational resources increases, the throughput of distributed online educational resource scheduling for different methods also increases. When the number of educational resources is 1000MB, the distributed online educational resource scheduling throughput of Comparison method 1 and Comparison method 2 is 974MB/s and 955MB/s, respectively. The distributed online education resource scheduling throughput of Proposal methods is as high as 985MB/s. From this, it can be seen that the distributed online education resource scheduling throughput of Proposal methods is high and can efficiently handle a large number of requests or tasks.

4 Conclusion

With the rapid development of information technology, teaching resources will become more and more abundant, especially the research on audio and video teaching resources, teaching resources sharing and teaching resources distribution services will be the most urgent requirements at present or in the future. Because of the heterogeneity of the Internet, network resources cannot be fully shared, and the traditional campus network structure also makes it difficult to share educational resources, and almost all educational resources use the C/S service mode, which makes the server face huge load pressure when facing large-scale user access, and it is difficult to ensure the quality of service. Therefore, this paper proposes a personalized scheduling method for distributed online education resources based on simulated annealing genetic algorithm. Build a user base model and interest model to improve user satisfaction and experience. Using fuzzy logic method, calculate the membership relationship between knowledge points and educational resources, and construct an educational resource model. This paper describes the key issues of personalized scheduling of educational resources, constructs the objective function of personalized scheduling of distributed online educational resources and solves it based on Simulated annealing genetic algorithm, which realizes personalized scheduling of distributed online educational resources, thus shortening the response time of distributed online educational resources. The proposed method greatly shortens the response time of distributed online educational resource scheduling, improves the scheduling accuracy of distributed online educational resources, and provides more effective method support for educational resource scheduling. But online education

resource scheduling involves a large amount of student data and personal privacy information. Future research should focus on how to protect the privacy and security of student data, and establish reliable data management and sharing mechanisms.

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