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# Construction of a Network Security Platform for Chinese Online Education Based on Ant Colony Algorithm

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**Abstract:**

In order to improve the quality of Chinese language and literature online teaching, this paper combines cloud computing and ant colony algorithm to build a Chinese language and literature online teaching platform. By analyzing the advantages and disadvantages of PSO algorithm and ACO algorithm, this paper proposes a PSACO2 algorithm that combines the advantages of both. In order to use ant colony algorithm to schedule cloud computing tasks, it is necessary to abstract all resource nodes into a directed complete graph. In addition, on the basis of the improved algorithm, a Chinese language and literature online platform based on cloud computing and ant colony algorithm is constructed. Through the experimental research, it can be seen that the Chinese language and literature online platform based on cloud computing and ant colony algorithm proposed in this paper can effectively improve the online teaching effect of Chinese language and literature.

**Keywords:** cloud computing; ant colony algorithm; database; Chinese language and literature; online platform;Network Security

## 1 INTRODUCTION

The society has higher and higher requirements for the cultivation of talents in universities. Whether the graduates have strong practical and application ability, and whether they have an innovative spirit has also become a criterion for selecting and employing people in various social units. In recent years, domestic colleges and universities have gradually paid more attention to the cultivation of practical and innovative abilities of students majoring in Chinese language and literature, and have taken many effective measures, such as the creation of creative writing and the residency of writers. These have made useful explorations on the talent training mode of Chinese language and literature majors. Different colleges and universities have different foundations, conditions and resources, so there will be different methods for exploring students' professional practice and cultivating innovation ability. As a university in the west, is located in an underdeveloped area, and conditions do not allow it to promote talent training by adopting the residency of famous writers like the universities in Beijing, Shanghai and Guangzhou. In addition, it tries to break through the limitations of classroom teaching, expand the teaching space into the broad social reality, realize the close interaction between inside and outside the classroom, and try to form a new mode of improving and cultivating the practical ability of professional talents with a certain personality that can adapt to the development requirements of the new situation.

In recent years, domestic colleges and universities have gradually paid more attention to the cultivation of practical and innovative abilities of Chinese language and literature majors, and have taken many effective measures, such as the creation of creative writing, writers' residency, etc., which are beneficial to the Chinese language and literature talent training model. explore. Different colleges and universities have different foundations, conditions and resources, so there will be different methods for exploring students' professional practice and cultivating innovation ability. In the professional construction in recent years, he has actively thought about and explored new models of talent training for Chinese language and literature majors, mainly in the aspects of cultivating undergraduates' literary originality, academic research, professional innovation and social practice. . Trying to break through the limitations of classroom teaching, expand the teaching space to the broad social reality, realize the close interaction between inside and outside the classroom, and try to form a new model of improving and cultivating the practical ability of professional talents with a certain personality that can adapt to the development requirements of the new situation .

The abstract nature of Chinese language and literature online teaching makes it difficult to teach. Therefore, this paper combines cloud computing and ant colony algorithm to build a Chinese language and literature online teaching platform, and tests the system to improve the teaching effect of the Chinese language and literature

online platform.

## 2 RELATED WORK

With the development of social informatization, the speed of IT technology updates and breakthroughs is getting faster and faster, and the emergence of cloud computing has become one of the most widely used network technologies today. As a new field of development and integration of traditional IT technologies such as distributed processing, parallel processing, and grid computing, cloud computing can also be said to be the practice of these scientific concepts in social business. influence our way of life and business model [1]. Today, when it comes to the specific definition of cloud computing, there is still no specific statement. In a narrow sense: cloud computing is a computing method that supports the Internet to meet the needs of users. This kind of request can be regarded as the sharing of resources. Such as hardware, platform and software, etc., and the network that provides the resources required by users is the "cloud" [2]; from the user's point of view, as long as they pay the corresponding fees according to their own needs, they can obtain the "cloud" anytime, anywhere. ” resources and services, and resources can be filled infinitely. In a broad sense, it refers to services and usage patterns. Of course, Internet-related services can also be other service patterns. We do not have an exact reference to it here [3].

Mobile cloud computing is an emerging technology emerging in today's IT development trend. It is the product of the combination of mobile technology and cloud computing technology. At the same time, the advantages of the two are maximized and well integrated [4]. Obviously, mobile terminals play an important role in people's daily life and work due to their high flexibility and practicability. Users use mobile terminal equipment and mobile Internet connections to access remote servers, and then according to their own needs, they can obtain information such as The underlying infrastructure, platform environment, cloud applications, and services such as data storage and processing [5]. Users have three working ways to use mobile cloud computing technology, namely, the mobile terminal device is connected to the "cloud", "micro cloud" and "cloud" [6]. In the whole service mode, because the mobile terminal itself has the characteristics of flexible use but low data storage and processing capabilities, it is only responsible for the input and output of data, and transfers these complex functions to the server side. The data is stored in the cloud, and the cloud services that need to be obtained and the application processing of the data can be transmitted through the network [7]. The mobile application that the user needs to use does not need to be downloaded-installed-configured separately, these tasks are all provided by the server. In addition, users can share access to the same application through different devices, thereby improving the efficiency of cloud storage and applications [8].

MapReduce is a parallel computing framework model, derived from the ideas of "Map" (mapping) and "Reduce" (reduction), and is mainly used to solve large-scale data processing and computing problems. It allows programmers to set the Map function and Reduce function by themselves, and at the same time, only need to input the parameter <key, value> value, and implement the two functions respectively to perform distributed computing [9]. In Hadoop1, the system completes the task scheduling management of the two function nodes through the JobTracker process. In Hadoop2, YARN can be considered as the support of MapReduce. Its emergence splits the tasks of JobTracker, corresponding to the new ResourceManager (RM) and ApplicationManager (AM). There is only one RM in the system, which is solely responsible for managing scheduling transactions. AM regards each application as an instance, which is a specific framework interface library and undertakes a lot of monitoring work [10]; the NodeManager (NM) process is responsible for managing each node; through this architecture, the management method of Job is changed from the previous The "system level" is transformed into "user level" [11].

As a warehouse for storing and managing data, the database can realize operations such as adding and deleting data. At present, the amount of data is not only huge, but also of various types, so the HBase database appears based on the Hadoop platform. It is a distributed and scalable open source database running on Hadoop. This design originates from "BigTable" in Google. Build huge data storage clusters on low-cost computer servers. Compared with other non-relational databases, HBase is more suitable for storing unstructured data. Another feature of HBase is that HBase is a column cluster-oriented storage model rather than row-oriented storage. It can utilize the distributed processing mode of HDFS, and perform offline processing and batch processing through MapReduce. It is a highly reliable, scalable and high-performance database storage system [12].

Web-based asynchronous online learning becomes possible [13]. Learners can learn independently rather than unilaterally instilled information. And learners can correctly acquire the knowledge they need. Reference [14] stated that the reason why mobile learning is difficult to promote is mainly limited by device performance (including capacity, memory, network bandwidth, etc.). Using the cloud as the background operation can not only reduce the utilization rate of some devices, but also facilitate large-scale deployment according to the corresponding needs. And through the cloud, data sharing between different devices can be achieved. In addition, the amount of resources in the cloud can also be rectified according to the actual situation, which is convenient enough. Reference [15] proposes the best online learning management methods including file sharing, web conferencing, etc. That is, through the use of shared cloud computing, the cloud computing architecture of online learning management, open resource course management and virtual online learning environment is realized. Literature [16] proposed that cloud computing is a revolution. It uses the Internet as a memory, any data and service requests are stored in the cloud server, and the completed requests are fed back to the user after the operation is completed. Since then, cloud computing security has become part of network security. Network data security is a very important part of cloud computing [17].

## 3 DATABASE BASED ON CLOUD COMPUTING AND ANT COLONY ALGORITHM

### 3.1 Cloud computing scheduling

The execution of cloud computing tasks is based on "decomposition" and "scheduling". It is assumed that the tasks run independently of each other. What task scheduling seeks is to reasonably allocate resources to each task, so as to minimize the total task completion time.

In order to use particle swarm and clam swarm algorithms, the particles need to be encoded first. For simplicity, the direct method is chosen.

There are a task, r resources, and a>r. When a=10, r=3, the coding sequence (3, 2, 2, 1, 3, 2, 3, 1, 1, 2) is a particle. Among them, each task corresponds to a resource. For example, task 3 corresponds to resource 1.

The particles are then decoded to get all the tasks run by each resource. For example, all tasks running on resource 1 are {4,8,9}.

Matrix $\mathbf{ETC}_{ij}$ is used to store the expected execution time of task i on resource j:

$$\mathbf{ETC}_{ij}=\begin{pmatrix} \mathrm{ETC}_{11} & \cdots & \mathrm{ETC}_{1r} \\ \vdots & \ddots & \vdots \\ \mathrm{ETC}_{a1} & \cdots & \mathrm{ETC}_{ar} \end{pmatrix}$$

Matrix $\mathbf{RTC}_{ij}$ is used to store the actual execution time of task i on resource j:

$$\mathbf{RTC}_{ij}=\begin{pmatrix} \mathrm{RTC}_{11} & \cdots & \mathrm{RTC}_{1r} \\ \vdots & \ddots & \vdots \\ \mathrm{RTC}_{a1} & \cdots & \mathrm{RTC}_{ar} \end{pmatrix}$$

$$\mathrm{resourceTime}\ (j)=\sum_{i=1}^{a}\mathrm{RTC}_{ij}\ (j=1,2,\cdots,r) \quad (1)$$

$$taskTime=\max(resourceTime(j))(j=1,2,\cdots,r) \quad (2)$$

Formula (1) represents the total time to complete all tasks on resource j. Among them, i represents the i-th task executed on resource j, and a represents the total number of tasks executed on resource j.

Formula (2) represents the total time after all tasks are completed.

Each particle has a fitness that measures its strengths and weaknesses.

In this paper, the total completion time of the task needs to be optimized, so the fitness function is defined as:

$$\text{fitness}\ (i)=\frac{1}{\text{taskTime}\ (i)}(i=1,2,\cdots,s) \quad (3)$$

In the formula, i represents the i-th particle, and s represents the population size.

**3.2 Design of cloud computing task scheduling**

The basic idea of particle swarm optimization is that each particle will fully consider two extreme values in the process of finding the optimal solution. The first is the position extremum that the particle itself can find, also called the individual optimal solution, and the second is the position extremum that the entire population can find, also called the global optimal solution.

The basic idea of ant colony algorithm is to let each ant independently find the optimal solution within a certain range. When an ant encounters an intersection with multiple paths, if no other ants have ever walked through it before, it arbitrarily selects one as the current path to continue searching, and releases a certain number of pheromones. As the number of iterations increases, there will be more and more pheromone on the path representing the optimal solution, and less and less on other paths, and finally the ant colony algorithm tends to be stable.

Based on the characteristics of the two algorithms, this paper proposes a task scheduling algorithm (PSACO2) that combines the advantages of both. The basic idea of the algorithm is to divide the iterative process into two parts, the particle swarm algorithm is used in the early stage, and the ant colony algorithm is used in the later stage.

The population size is s, the total number of tasks is a, and the total number of resources is r. Then, the initialization is described as: the system randomly generates s particles, the vector $\mathbf{x}_i$ represents the position of particle i.The initial position of the particle is a random integer between [1, r], and the particle velocity is a random integer within [-r, r].

According to equations (4) and (5), the position and velocity of the particles are updated.

$$\begin{aligned} v_{id}(t+1)=\omega v_{id}(t)+c_1 r_1\left(p_{id}(t)-x_{id}(t)\right)+ \\ c_2 r_2\left(p_{\text{gd}}(t)-x_{id}(t)\right) \end{aligned} \quad (4)$$

$$x_{id}(t+1)=x_{id}(t)+v_{id}(t+1) \quad (5)$$

Among them, $\omega$ is the inertia weight, $c_1$ and $c_2$ are acceleration coefficients, and $r_1$ and $r_2$ are random factors.

In order to improve the intelligence of the PSO algorithm, many improved methods of inertia weight $\omega$ have been proposed. $\omega$ is defined as:

$$\omega(t)=\omega_{\min}+\left(\omega_{\max}-\omega_{\min}\right)\cdot\exp\left(-k\left(t/t_{\max}\right)^2\right) \quad (6)$$

Among them, k is the control factor, $\omega_{\min}$ and $\omega_{\max}$ are the minimum and maximum inertia weights, respectively, t is the number of iterations, and $t_{\max}$ is the maximum number of iterations.

The improvement of learning factor $c_1$、$c_2$ mainly focuses on two aspects: one is a linear adjustment strategy, and the other is a nonlinear adjustment strategy. $c_1$、$c_2$ are defined as:

$$c_1=c_{1\text{s}}+\left(c_{1\text{e}}-c_{1\text{s}}\right)\times\left(t/t_{\max}\right) \quad (7)$$

$$c_2 = c_{2s} + (c_{2e} - c_{2s}) \times (t / t_{max}) \quad (8)$$

Among them, $c_{1s}$ is the initial iteration value of $c_1$, $c_{1e}$ is the final iteration value of $c_1$, $c_{25}$ is the initial iteration value of $c_2$, and $c_{2e}$ is the final iteration value of $c_2$.

In order to further improve the generation quality of the initial pheromone and the convergence speed of the ant colony algorithm in the later stage, part of the hybridization optimization of the particle swarm optimization algorithm in the earlier stage can be carried out. The positions of the progeny produced by the hybridization operation are:

$$x_{child,1}(t) = px_{parent,1}(t) + (1.0 - p)x_{parent,2}(t) \quad (9)$$

$$x_{child,2}(t) = px_{parent,2}(t) + (1.0 - p)x_{parent,1}(t) \quad (10)$$

Among them, $x_{child}$ is the position of the child particle, $x_{parent}$ is the position of the parent particle, and p is a random number between [0,1].

The velocity of the descendant particles is:

$$v_{child,1}(t) = \frac{v_{parent,1}(t) + v_{parent,2}(t)}{\left| v_{parent,1}(t) + v_{parent,2}(t) \right|} v_{parent,1}(t) \quad (11)$$

$$v_{child,2}(t) = \frac{v_{parent,1}(t) + v_{parent,2}(t)}{\left| v_{parent,1}(t) + v_{parent,2}(t) \right|} v_{parent,2}(t) \quad (12)$$

Among them, $v_{child}$ is the velocity of the child particle, and $v_{parent}$ is the velocity of the parent particle.

The mutation operation adopts the reverse mutation method.

### 3.3 Ant colony algorithm based on cloud computing

In order to use ant colony algorithm to schedule cloud computing tasks, it is necessary to abstract all resource nodes into a directed complete graph. If it is assumed that there are 4 resources and 6 tasks in the cloud computing environment, the directed complete graph abstracted from the resources is shown in Figure 1.

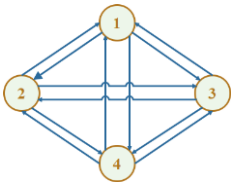


Figure 1. Directed complete graph composed of resource nodes

When scheduling begins, all tasks are randomly placed on resource nodes.

The initial value of the pheromone is set to:

$$\tau_s = \tau_c + \tau_g \quad (13)$$

Among them, $\tau_c$ j is a given pheromone constant, and $\tau_g$ is a pheromone value converted from the scheduling result of the previous particle swarm optimization.

The specific method is to select the top 10% individuals with the best fitness value in the population when the particle swarm optimization is terminated as the optimal solution set. Initially, it sets $\tau_g$ to 0, and for each

solution in the set of optimized solutions, $\tau_g$ adds to the constant k.

The probability that the k-th ant transfers from resource node i to resource node j at time t is set as:

$$p_{ij}^{k}(t)=\begin{cases}\dfrac{\left[\tau_{ij}(t)\right]^{\alpha}\left[\eta_{ij}(t)\right]^{\beta}}{\sum_{sc\ \text{allowed}_k}\left[\tau_{is}(t)\right]^{\alpha}\left[\eta_{is}(t)\right]^{\beta}}, j\in \text{allowed}_k \\ 0,\ \text{else}\end{cases} \quad (14)$$

Among them, $allowed_k=\{C-\text{tabu}_k\}$ represents the resource node that ant k is allowed to select at time t+1, and $\text{tabu}_k$ represents the taboo table, which saves the resources that ant k has searched. $\eta_{ij}$ represents heuristic information; $\tau_{ij}$ represents the amount of residual information, $\alpha$ and $\beta$ respectively represent the relative importance of residual information and heuristic information to the ant colony optimization process.

The value of $\eta_{ij}$ is:

$$\eta_{ij}(t)=\frac{1}{\text{ETC}_{ij}^{k}(t)}=\frac{1}{\text{ETC}_{kj}} \quad (15)$$

When ant k moves from one node i to another node j, the pheromone of the node will change. Formula (16) and Formula (17) give the local update method of pheromone:

$$\tau_{ij}(t+1)=(1-\rho)\tau_{ij}(t)+\sum_{k=1}^{a}\Delta\tau_{ij}^{k}(t) \quad (16)$$

$$\Delta\tau_{ij}^{k}(t)=$$

$$\begin{cases}\dfrac{Q}{\text{ETC}_{ij}^{k}(t)}=\dfrac{Q}{\text{ETC}_{kj}} & \text{The k-th ant chooses } x_{ij} \text{ between t and t+1} \\ 0,\ \text{else}\end{cases} \quad (17)$$

Among them, $\rho$ is a random number between [0, 1], which represents the pheromone volatilization coefficient, and $1-\rho$ is the residual coefficient of pheromone, $\Delta\tau_{ij}^{k}$ represents the number of pheromones left on the path (i, j) by ant k in the current path transition, and Q is a constant.

When all ants complete a cycle, the pheromone needs to be updated globally, and the formula is as follows:

$$\tau_{ij}(t+n)=(1-\rho)\tau_{ij}(t)+\sum_{k=1}^{a}\Delta\tau_{ij}^{k}(t) \quad (18)$$

$$\Delta\tau_{ij}^{k}(t)=$$

$$\begin{cases}\dfrac{Q}{\text{resourceTime}\ (j)}, & \text{The k-th ant selects } x_{ij} \text{ in this cycle} \\ 0, else\end{cases} \quad (19)$$

The detailed description of the PSACO2 algorithm is given below.

Input: randomly generated initial population;

Output: global optimal solution.

(1) The algorithm gives the value of the relevant parameters in the algorithm;

(2) The algorithm encodes the particles and initializes the population according to the requirements;

(3) The algorithm randomly divides the population into two equal subgroups, which are numbered 1 and 2 respectively;

(4) The algorithm performs different processing on whether the current subgroup is No. 1 or No. 2; (5) If it is the No. 1 subgroup, the algorithm uses the particle swarm algorithm to update the position and velocity of the particles;

(6) If it is the No. 2 subgroup, the algorithm uses the genetic algorithm to update the position and velocity of the particle;

(7) The algorithm re-merges the two subgroups into one population;

(8) The algorithm judges whether the previous iteration satisfies the stopping condition or reaches the number of iterations;

(9) If it is not satisfied, the algorithm returns to step (3); if it is satisfied, the algorithm executes step (10);

(10) The algorithm selects the top 10% individuals with the best fitness value from step (7), and generates the initial pheromone of the ant colony algorithm according to formula (13);

(11) The algorithm establishes the task scheduling model of the ant colony algorithm, and initializes the algorithm parameters;

(12) Each ant selects a transfer node according to formula (14), performs local pheromone update according to formula (16) and (17), and adds the selected node to the taboo table;

(13) When all ants complete one cycle, the algorithm performs global pheromone update according to formulas (18) and (19);

(14) The algorithm judges whether the later iteration satisfies the stopping condition or reaches the number of iterations;

(15) If it is not satisfied, the algorithm returns to step (12); if it is satisfied, the algorithm outputs the global optimal solution. The flow chart of the PSACO2 algorithm is shown in Figure 2.

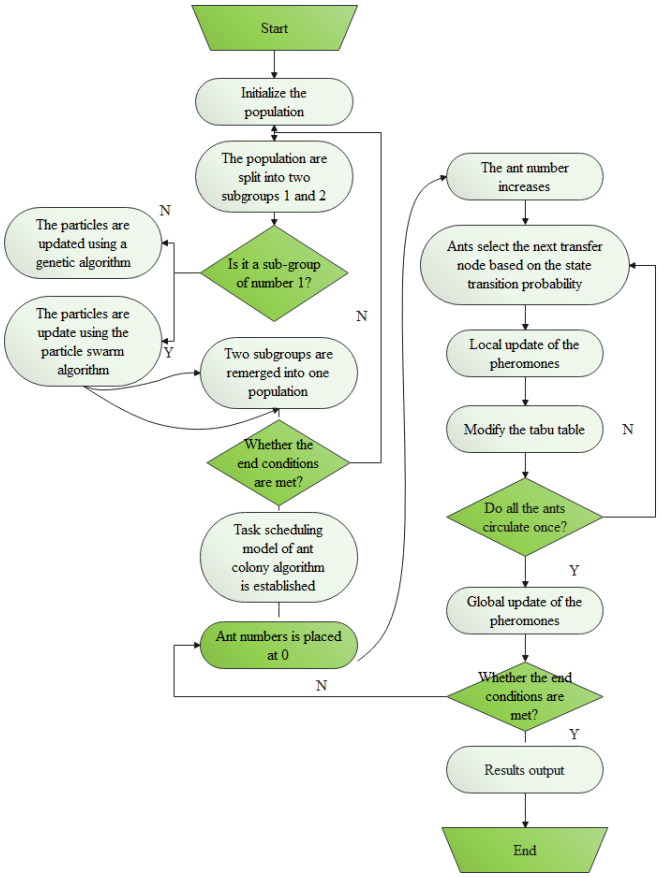


Figure 2 Flowchart of the PSACO2 algorithm

The PSACO2 algorithm is divided into two stages, the first stage uses particle swarm algorithm with genetic operator, and the second stage uses ant colony algorithm. m is the number of tasks, n is the number of resources, s is the number of particles, and $N_1$ is the number of iterations in the first stage. The maximum number of iterations in the first stage is $N_{1max}$, $N_2$ is the number of iterations in the second stage, and the maximum number of iterations in the second stage is $N_{2max}$.

## 4 Chinese language and literature online platform based on cloud computing and ant colony algorithm

The design of J2EE application is composed of components, each component has independent functions, and constitutes J2EE application according to related classes and files. The J2EE server also provides strong support for components in the form of containers. Therefore, it does not require separate development, but only needs to solve business problems. Figure 3 below shows the architecture of J2EE.

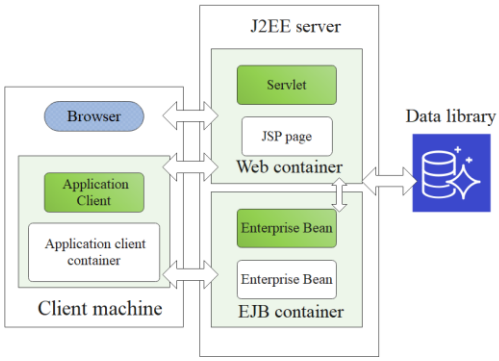


Figure 3 Structure diagram of J2EE architecture

The Chinese language and literature teaching resource platform designed and constructed in this paper is based on the mobile cloud computing environment platform, which adds a mode for college users to access the

platform system through mobile devices, as shown in Figure 4.

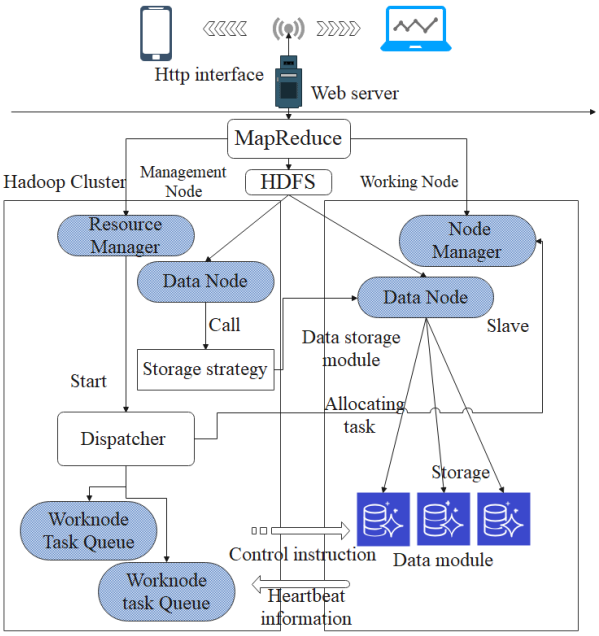


Figure 4 Architecture of the teaching resource platform

According to the analysis of the functional requirements of the platform system for Chinese language and literature users in colleges and universities, and the characteristics of the teaching resources themselves, the Chinese language and literature teaching platform system is now divided into four subsystems, as shown in Figure 5.

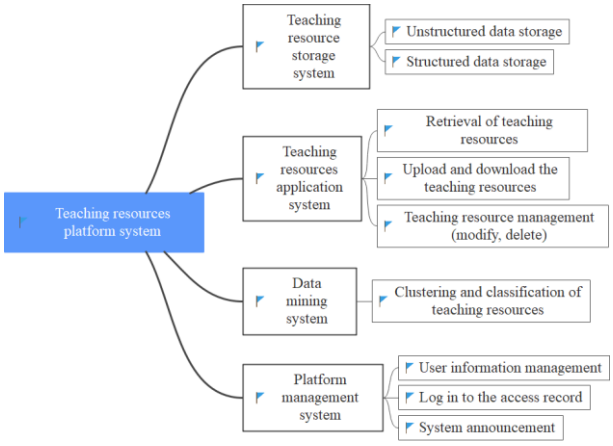


Figure 5 System structure design of Chinese language teaching resource platform

Structured data is mostly index table or data with less access such as system administrators, so this article will not repeat them. This paper is mainly designed for unstructured data such as teaching resource data. HBase database has the characteristics of being based on Hadoop cluster, column-oriented, easy to expand, good at storing unstructured data, and flexible in table structure design. It can store massive teaching resource data and can handle multi-user explosive data well. Figure 6 shows the data storage structure of Chinese language teaching resources.

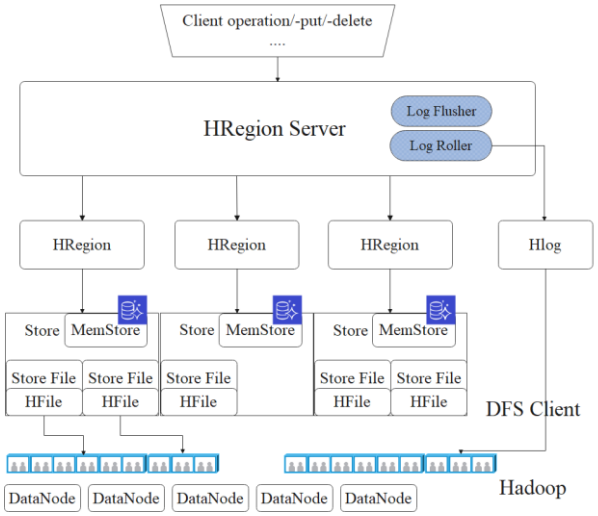


Figure 6 Storage structure of Chinese language teaching resource data

The schematic diagram of the Map/Reduce calculation process is shown in Figure 7, and there are three steps. Map task (Map): Each input task is a file block oriented to the distributed file system, and the file block can be one or more. Master Controller: When each Map task is completed, the master controller will collect a series of key-value pairs, and then re-sort them according to the value of the key, and then assign these keys to all the Reduce tasks. Induction task (Reduce): It acts on one key at a time (there may be multiple key-value pairs), combining all the values associated with this key into an iterative list. The specific processing process is written and implemented by the user in the Reduce function code.

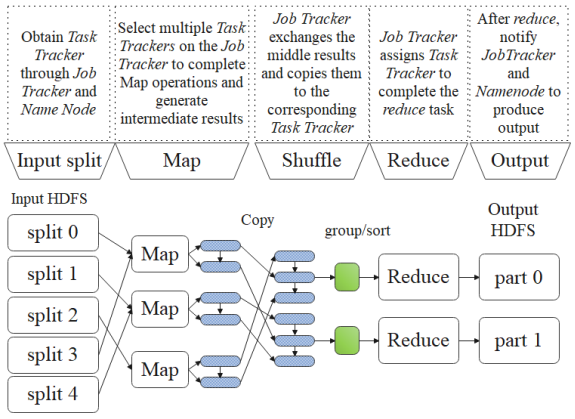


Figure 7 Schematic diagram of the Map/Reduce calculation process

According to the resource recommendation process of the education cloud platform shown in Figure 8, we first define the following: the user set is U, and the resource set is R={A,B}; A is the set of resources accessed by U1, and B is the set of resources that have not been accessed by U. The dataset in the previous section should be a 2-tuple of {U, A}. Then, the main steps of the process can be described as follows:

1. Through the bipartite graph composed of U and A, the single-mode projection graph G=(N, E) of the resource class nodes of the A set is obtained. Among them, N is a node, which represents each resource of A set respectively, and E is an edge between nodes, which represents the number of users whose resources of two nodes have been accessed by a user in U1. 2. For each node Ni in G, the adjacent nodes Nj are sorted in descending order of edge value. 3. For each node in G, the first K are taken out (when the number of adjacent nodes n is less than K, the first n are taken out), and the adjacent nodes are recommended according to the size of the edge weight. For nodes without adjacent nodes in G and resource nodes of type B in the resource set, the original knowledge point matching rule recommendation method is retained.

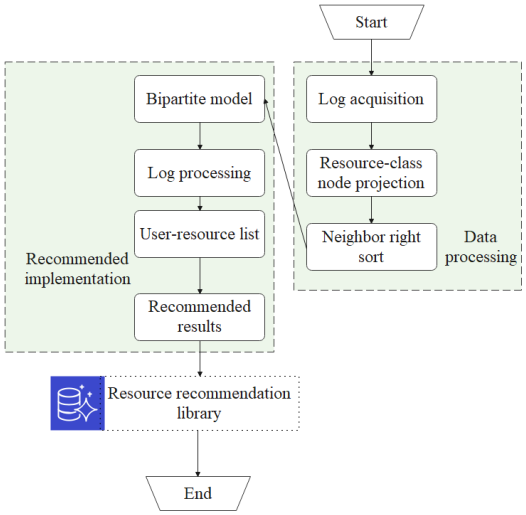


Figure 8 The resource recommendation process of the Chinese language and literature platform

On the basis of the above research, the Chinese language knowledge processing process of the Chinese language and literature online platform based on cloud computing and ant colony algorithm proposed in this paper is simulated and expressed through visualization methods. Figure 9 below shows a schematic diagram of the visual simulation.

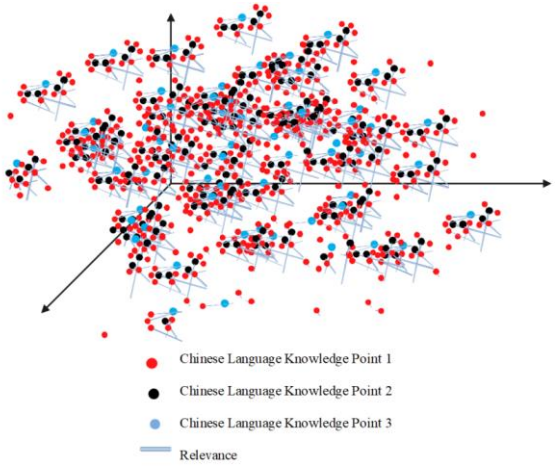


Fig. 9 Visualization diagram of Chinese language and literature online platform based on cloud computing and ant colony algorithm

On the basis of the above research, the online teaching effect of the Chinese language and literature online platform based on cloud computing and ant colony algorithm proposed in this paper is verified, and the results are shown in Table 1.

Table 1 Teaching effect of Chinese language and literature online platform based on cloud computing and ant colony algorithm

| Number | Teaching effect | Number | Teaching effect | Number | Teaching effect | Number | Teaching effect |
|---|---|---|---|---|---|---|---|
| 1 | 81.32 | 14 | 81.23 | 27 | 87.02 | 40 | 90.36 |
| 2 | 87.00 | 15 | 83.89 | 28 | 90.84 | 41 | 86.15 |
| 3 | 88.77 | 16 | 83.07 | 29 | 81.81 | 42 | 84.14 |
| 4 | 82.42 | 17 | 87.37 | 30 | 89.33 | 43 | 86.74 |
| 5 | 88.37 | 18 | 82.18 | 31 | 83.03 | 44 | 86.83 |
| 6 | 89.85 | 19 | 84.30 | 32 | 88.76 | 45 | 86.04 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 7 | 91.29 | 20 | 91.23 | 33 | 91.61 | 46 | 83.28 |
| 8 | 83.93 | 21 | 83.81 | 34 | 91.93 | 47 | 87.25 |
| 9 | 84.63 | 22 | 90.79 | 35 | 83.35 | 48 | 85.86 |
| 10 | 83.52 | 23 | 88.58 | 36 | 87.55 | 49 | 85.79 |
| 11 | 90.67 | 24 | 83.06 | 37 | 91.19 | 50 | 83.88 |
| 12 | 86.60 | 25 | 86.31 | 38 | 83.65 | 51 | 84.61 |
| 13 | 84.91 | 26 | 87.62 | 39 | 88.70 | 52 | 91.03 |

Through the above experimental research, it can be seen that the Chinese language and literature online platform based on cloud computing and ant colony algorithm proposed in this paper can effectively improve the online teaching effect of Chinese language and literature.

## 5 CONCLUSION

At present, the society has higher and higher requirements for the cultivation of talents in universities. Moreover, whether the graduates have strong practical and application ability, and whether they have an innovative spirit has also become a criterion for selecting and employing people in various social units. The abstract nature of Chinese language and literature teaching in schools leads to certain difficulties in teaching. Therefore, this paper combines cloud computing and ant colony algorithm to build an online teaching platform for Chinese language and literature. The experimental research shows that the Chinese language and literature online platform based on cloud computing and ant colony algorithm proposed in this paper can effectively improve the online teaching effect of Chinese language and literature.

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