

## Retraction

# Retracted: Virtual Simulation Management of Data Traffic Optimization of Big Data Cloud Platform considering Multipoint Mapping Algorithm

### Advances in Multimedia

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

- (1) Discrepancies in scope
- (2) Discrepancies in the description of the research reported
- (3) Discrepancies between the availability of data and the research described
- (4) Inappropriate citations
- (5) Incoherent, meaningless and/or irrelevant content included in the article
- (6) Peer-review manipulation

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their

agreement or disagreement to this retraction. We have kept a record of any response received.

### References

- [1] H. Wu, "Virtual Simulation Management of Data Traffic Optimization of Big Data Cloud Platform considering Multipoint Mapping Algorithm," *Advances in Multimedia*, vol. 2021, Article ID 4893145, 8 pages, 2021.

## Research Article

# Virtual Simulation Management of Data Traffic Optimization of Big Data Cloud Platform considering Multipoint Mapping Algorithm

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With the continuous development of Internet, cloud computing, and other technologies, build a cloud platform based on Cloud Computing Center, but how to effectively carry out operation and maintenance and face users to ensure the continuity and effectiveness of the platform is extremely important. In view of these needs and limitations, this paper introduces the multipoint mapping algorithm, combs the statistical methods of platform cloud traffic, carries out platform data traffic by classification, constructs the data traffic optimization management model, analyzes the relevant data samples, carries out statistical calculation for data diversion tasks, analyzes and processes the priority indicators, and forms the final results through continuous iteration, realizing the management of data flow optimization virtual simulation of big data cloud platform. Simulation results show that the multipoint mapping algorithm is effective and can effectively support the data flow of big data cloud platform and optimize virtual simulation management.

## 1. Introduction

With the continuous development of cloud computing, Internet of things, and other technologies, cloud computing centers are gradually rising everywhere [1]. Many cloud platforms relying on the cloud computing center have also been continuously built, which has promoted the development of smart cities (applications) everywhere. On the one hand, users have high requirements for cloud platform quality; on the other hand, for multiuser concurrency, a stable and effective cloud platform is needed to achieve multiuser access [2, 3]. Therefore, how to effectively supervise the whole process and life cycle of the cloud platform, especially how to optimize the data flow, is extremely important [4–6].

The cloud platform not only has the basic functions of software but also contains some characteristics of the cloud. For example, the cloud platform provides corresponding application services through SaaS, provides basic cloud

facilities through SaaS, and realizes the application expansion of the cloud platform through IaaS. Users put forward service requests to the cloud platform according to their own business needs. How to provide the fastest service with the minimum response time, ensure the effective access of users, and realize or eliminate invalid access is extremely important [7–9].

Industry experts have done a lot of research on this. By constructing the platform data flow and data analysis model, the platform data flow detection module is divided into subunits, and statistics are made according to the subunits to optimize the task management process. This method is relatively simple, but there is a problem of low management efficiency. In addition, once again, some experts proposed to use priority to optimize the platform data traffic management and build the corresponding data traffic optimization management model according to the corresponding characteristics through priority setting. Although this method has high accuracy, it is complex to calculate [10–14].

In view of the above limitations and requirements, this paper attempts to introduce the multipoint mapping algorithm, build a data traffic optimization management model by making time-division statistics on the network traffic of the cloud platform, make statistical calculation for the data diversion task, analyze and process the priority indicators, and form the final results through continuous iteration. It aims to optimize the data flow of big data cloud platform and realize virtual simulation management.

**1.1. Multipoint Mapping Decomposition Algorithm.** For the multipoint mapping decomposition algorithm, firstly, the statistical time is divided into  $n$  subunits. The statistical cloud platform data traffic is unknown. Through the separate statistics of the subunits, the results are finally summarized [15, 16]. Therefore, the number of iterations can be estimated according to the coverage length of the corresponding operation data, as shown in the following formula:

$$L\left[\frac{p}{2}\right] = \begin{cases} \frac{p}{2}, & p \text{ is even,} \\ \frac{p+1}{2}, & p \text{ is odd,} \end{cases} \quad (1)$$

where the length of statistical data is expressed by  $P+1$ .

On the basis of formula (1), use formula (2) to analyze the data of the statistical cycle, and use the square of the mean difference, the square of the mean difference, and the sum of the two indicators to sort the data flow sequence [17, 18], as shown in the following formula:

$$R_2^2 = \sum_{k=1}^l \sum_{j=1}^n (z_{jk} - y_k)^2, \quad (2)$$

$$R_3^2 = \sum_{k=1}^l n(y_k - y)^2,$$

where  $y_k = 1/n \sum_{j=1}^n z_{jk}$  and  $y = 1/n \sum_{j=1}^n y_j$ .

The variance ratio in each cycle can be calculated by using the following formula:

$$G = \frac{R_3^2/g_3}{R_2^2/g_2}. \quad (3)$$

By initializing the data flow data, the corresponding data flow components are randomly selected to build the corresponding model, as shown in the following formula:

$$y(u) = \chi_{q,1}y(u-1) + \chi_{q,2}y(u-2) + \dots + \chi_{q,p}y(u-p). \quad (4)$$

For the model, the specific decomposition steps mainly include the following:

- (1) Through initialization, the regression parameters are obtained, and the equations are solved by formula (5), as shown below:

$$\begin{cases} \chi_{j,1} = \eta_1, \\ \chi_{l,1} = \frac{\eta_l - \sum_{k=1}^{l-1} \chi_{l-1,k} \eta_{l-1}}{1 - \sum_{k=1}^{l-1} \chi_{l-1,k} \eta_k}, \quad l = 2, 3, \dots, \eta_l = \frac{\sum_{j=1}^{p-1} Y_{3j} Y_{3j+l}}{\sum_{j=1}^p Y_{3j}^2}, \\ \chi_{l,k} = \chi_{l-1,k} - \chi_{l-1,l-k}, \quad k = 1, 2, \dots, l-1. \end{cases} \quad (5)$$

- (2) The order of the component model can be calculated by using the following formula:

$$B = \min \left\{ p \left| p \frac{\sum (Y_3(u) - \bar{Y}_3)^2}{p - Q - 1} \right. \right\}, \quad (6)$$

where  $\bar{Y}_3$  is the average of  $Y_3(u)$ .

- (3) Build the corresponding model, initialize the corresponding parameters, and process the flow data to obtain the corresponding component model, as shown in the following formula:

$$t(u) = \chi_{q,1}t(u-1) + \chi_{q,2}t(u-2) + \dots + \chi_{q,q}t(u-q). \quad (7)$$

According to the existing model, the data traffic of the corresponding platform is managed by classification and classification, so as to realize the effective provision of network services. If the cloud platform has malicious access, the abnormal data traffic will occur in a short time. If the subunits are divided in the traditional way, the network transmission load will be caused. The service performance of cloud platform will certainly be affected. In addition, it will also cause hidden dangers of network security [19, 20].

For the big data cloud platform, map and reduce functions are used to transfer data traffic and realize complete summary and statistics of data traffic. The specific flowchart is shown in Figure 1.

As shown in Figure 1, firstly, according to the multitask multipoint mapping decomposition technology, the network operation features are matched and calculated, the data packets corresponding to the network operation features are extracted from the HDFS cache, and the elements in the other databases are subjected to similarity matching processing. The similarity ranking of key values can be obtained by reordering and dividing the obtained results. Extract the first  $p$  key value pairs from the above key values and write the above data to HDFS.

### 1.2. Cloud Platform Data Traffic Management Principle.

For the data traffic of big data cloud platform, firstly, it is necessary to obtain the task attributes of subunits, mark the virtual resources of different task subunits for different platforms, and count the specific time of data traffic diversion of users accessing platform resources, so as to count and analyze the specific time required for the execution of virtual simulation resources of subunits. Get the data task priority of the corresponding big data cloud platform and

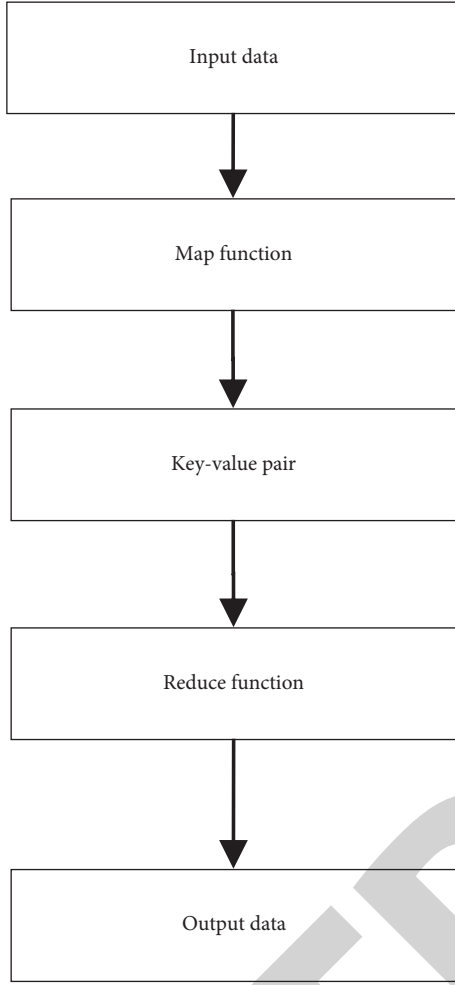


FIGURE 1: Initial data processing flow.

build the corresponding data traffic management model. The specific process mainly includes the following.

The sample data statistics of subunit tasks are carried out for the user access traffic of the platform, as shown in the following formula:

$$T(n) = \{t_1, t_2, \dots, t_n\}, \quad (8)$$

where  $n \in N$  and  $t_i$  represent the  $i$ -th shunting subtask ( $i = 1, 2, \dots, n$ ) in the set. The attribute vector corresponding to the shunting task  $t_i$  is represented by

$$t_i = (t_{i,d}^i, t_{mi}^i, t_{fee}^i, t_{deadline}^i, t_{memory}^i, t_{bw}^i, t_{submit}^i). \quad (9)$$

The number of initialized virtual machine platforms is represented by  $m$ , as shown in the following formula:

$$VM(m) = \{vm_1, vm_2, \dots, vm_m\} (m \in N), \quad (10)$$

where  $vm_{i,d}^j$  represents the  $j$ th virtual machine  $vm_{capacity}^j$ , and the corresponding attribute vector of virtual machine resources is calculated, as shown in the following formula:

$$vm_j = (vm_{i,d}^j, vm_{capacity}^j, vm_{bw}^j, vm_{memory}^j). \quad (11)$$

The expected execution time of the big data cloud platform data traffic diversion subtask can be calculated by

$$ETC_{ij} = \frac{t_{mi}^i}{vm_{capacity}^j}. \quad (12)$$

The expected completion time of shunting task  $t_i$  on the virtual machine is shown in the following formula:

$$ECT_{ij} = be_j + ETC_{ij}. \quad (13)$$

Set the corresponding big data platform data flow task, which can be calculated by

$$\text{Makespan} = \max\{ECT_{ij}\}. \quad (14)$$

The objective function and constraint conditions of data traffic diversion task of big data cloud platform are used for calculation, as shown in the following formula:

$$\begin{cases} \min\{\text{Makespan}\}, \\ \begin{cases} t_{memory}^i \leq vm_{memory}^j, i = 1, 2, \dots, n, \\ t_{bw}^i \leq vm_{bw}^j, j = 1, 2, \dots, m. \end{cases} \end{cases} \quad (15)$$

In the form of linear programming, the objective function given by (15) is solved for (15). Assuming that (15) holds,  $\omega'$  is the optimal solution of the current platform data traffic diversion task, and the cloud platform data traffic management model is established by using

$$\begin{cases} \omega' = \omega + \frac{(1-p)(1-\text{rand}())}{e^y}, \\ 1/e^{\Delta y/(1+T_i)} > \text{rand}(), \end{cases} \quad (16)$$

where  $\text{rand}()$  is a random number in the interval  $[0, 1]$ .

**Lemma 1.** In the CSDG model,  $\forall \sigma_{-i}, \sigma_i \in [0, 1]$  and  $T_i$  are quasiconvex and are lower semicontinuous functions of  $\sigma_i$ .

If  $T_i^{\text{local}}(0) \geq T_i^{\text{cloud}}(\sigma_{-i}, 0)$  and  $T_i^{\text{local}}(1) \leq T_i^{\text{cloud}}(\sigma_{-i}, 1)$ ,  $\sigma'_i > 0$  makes the expressions of  $T_i^{\text{local}}(\sigma'_i) = T_i^{\text{cloud}}(\sigma'_i)$  and  $T_i$  as shown in the following formula:

$$\begin{aligned} \sigma'_i &= \frac{\mu_c - \mu_i + \lambda_i - \sum_{k \neq i} \sigma_k \lambda_k}{2\lambda_i}, \\ T_i &= \begin{cases} T_i^{\text{local}}(\sigma_i), \sigma_i \in [0, \sigma'_i], \\ T_i^{\text{cloud}}(\sigma), \sigma_i \in [\sigma'_i, 1], \end{cases} \end{aligned} \quad (17)$$

It can be seen from the above formula that  $T_i$  is a continuous function of  $\sigma_i$  in the interval  $[0, 1]$ .

If  $T_i^{\text{local}}(0) < T_i^{\text{cloud}}(\sigma_{-i}, 0)$ ,

$$T_i = \begin{cases} T_i^{\text{local}}(\sigma_i), \sigma_i = 0, \\ T_i^{\text{cloud}}(\sigma), \sigma_i \in (0, 1]. \end{cases} \quad (18)$$

If  $T_i^{\text{local}}(0) > T_i^{\text{cloud}}(\sigma_{-i}, 0)$  and  $T_i^{\text{local}}(1) > T_i^{\text{cloud}}(\sigma_{-i}, 1)$ ,

$$T_i = \begin{cases} T_i^{\text{local}}(\sigma_i), & \sigma_i \in (0, 1], \\ T^{\text{cloud}}(\sigma), & \sigma_i = 1. \end{cases} \quad (19)$$

**Theorem 1.** CSDG has a unique pure strategy Nash equilibrium.

It is proved that in the CSDG model, the participant strategy set is a real number set of  $[0, 1]$  interval. The utility function is defined as  $U_i = -T_i$ . According to Lemma 1,  $\forall \sigma_i, U_i(\sigma_i)$  is quasiconcave and upper semicontinuous in  $[0, 1]$ .

Next, the continuity of  $U_i$  at  $\sigma_i$  is analyzed. The specific calculation is shown in the following formula:

$$\sigma_i'' = \frac{\mu_c - \mu_i + \lambda_i - \sum_{k \neq i} \sigma_k' \lambda_k - \delta \lambda_i}{2\lambda_i}, \quad (20)$$

where  $\delta \rightarrow 0$  and  $T_i^{\text{local}}(\sigma_i'') - T_i^{\text{local}}(\sigma_i') \rightarrow 0$ ; then,  $\Delta U_i \rightarrow 0$ .

According to the above analysis, assuming  $\forall i, 0 < \sigma_i < 1$  in the steady state, the following conditions must be met:

$$\mu_i - (1 - \sigma_i)\lambda_i = \mu_c - \sum_{i=1}^n \sigma_i \lambda_i. \quad (21)$$

Formula (22) can be obtained by solving on the basis of formula (21):

$$(1 - \sigma_i)\lambda_i = \mu_i - \frac{(\sum_{j=1}^n \mu_j + \mu_c) - \sum_{j=1}^n \lambda_j}{n}. \quad (22)$$

Formula (23) can be obtained by solving on the basis of formula (22):

$$\sigma_i = 1 - \frac{\mu_i}{\lambda_i} + \frac{(\sum_{j=1}^n \mu_j + \mu_c) - \sum_{j=1}^n \lambda_j}{(n+1)\lambda_i}. \quad (23)$$

When  $\mu_1 - \lambda_1 < \mu_c < \mu_1 + n\lambda_1$ , select  $\sigma^*$  to make  $T^{\text{local}}(\sigma_i^*) = T^{\text{cloud}}(\sigma^*)$ .

SaaS will select a certain proportion to divert service requests, as shown in the following formula:

$$\frac{1}{\mu_1 - (1 - \sigma^*)\lambda_1} = \frac{1}{\mu_c - \sum_{i=1}^n \sigma^* \lambda_i}. \quad (24)$$

Solve on the basis of formula (24) to get

$$\sigma^* = \frac{\mu_c - \mu_1 + \lambda_1}{(n+1)\lambda_1}. \quad (25)$$

The equilibrium expression of SaaS under the condition of consistency can be calculated by

$$\sigma^* = \begin{cases} 0, & (\mu_c \leq \mu_1 - \lambda_1), \\ \frac{\mu_c - \mu_1 + \lambda_1}{(n+1)\lambda_1}, & (\mu_1 - \lambda_1 < \mu_c < \mu_1 + n\lambda_1), \\ 1, & \mu_c \geq \mu_1 + n\lambda_1. \end{cases} \quad (26)$$

In this paper, PoA (price of analysis) is used to analyze the effectiveness of the system. The specific formula can be calculated as follows:

$$\text{PoA}(G) = \max \frac{U(a^{\text{opt}})}{U(a)}, \quad (27)$$

where  $a$  is any equilibrium in game  $G$ . The specific calculation is shown in the following formula:

$$\text{PoA} = \frac{C(\sigma^*)}{C(\sigma^{\text{opt}})}. \quad (28)$$

At this time, the description of social utility optimization problem is shown in the following formula:

$$C(\sigma) = \min \sum_{i=1}^n \{(1 - \sigma_i)\lambda_i T_i^{\text{local}}(\sigma_i) + \sigma_i \lambda_i T^{\text{cloud}}(\sigma)\} \quad (29)$$

$$s.t. \quad \mu_i > \lambda_i, 0 \leq \sigma_i \leq 1, \sum \sigma_i \lambda_i < \mu_c.$$

The user shall have the same shunt ratio  $\sigma$ , and the specific calculation is shown in the following formula:

$$C(\sigma) = (1 - \sigma)T^{\text{local}}(\sigma)\lambda_1 + \sigma T^{\text{cloud}}(\sigma)\lambda_1. \quad (30)$$

The formula is a continuous function about  $\sigma$  in the interval  $(0, 1)$ , and the extreme value is calculated according to formulas (1) and (2):

$$\sigma^{\text{opt}} = \frac{\sqrt{\mu_1}\mu_c - \sqrt{\mu_c}\mu_1 + \sqrt{\mu_c}\lambda_1}{\sqrt{\mu_c}\lambda_1 + n\sqrt{\mu_1}\lambda_1}. \quad (31)$$

Because  $0 \leq \sigma^{\text{opt}} \leq 1$ , when the right side of (31) is greater than 1,  $\sigma^{\text{opt}} = 1$  is taken, and when the right side of (10) is less than 0,  $\sigma^{\text{opt}} = 0$  is taken to obtain the expression of  $C(\sigma^{\text{opt}})$ , as shown in the following formula:

$$C(\sigma^{\text{opt}}) = \begin{cases} \frac{1}{\mu_1 - \lambda_1}, & (\sigma^{\text{opt}} = 0), \\ \frac{1 - (\sqrt{\mu_1/\mu_c} - 1)\sigma^{\text{opt}}}{\mu_1 - (1 - \sigma^{\text{opt}})\lambda_1}, & (0 < \sigma^{\text{opt}} < 1), \\ \frac{1}{\mu_c - n\lambda_1}, & (\sigma^{\text{opt}} = 1). \end{cases} \quad (32)$$

According to (32), the social cost function under equilibrium is obtained, as shown in the following formula:

$$C(\sigma^*) = \begin{cases} \frac{1}{\mu_1 - \lambda_1}, & (\sigma^* = 0), \\ \frac{1}{\mu_1 - (1 - \sigma^*)\lambda_1}, & (0 < \sigma^* < 1), \\ \frac{1}{\mu_c - n\lambda_1}, & (\sigma^* = 1). \end{cases} \quad (33)$$

Therefore, when both  $\sigma^{\text{opt}}$  and  $\sigma^*$  are in the  $(0, 1)$  interval,

$$\text{PoA} = \frac{(n+1)\lambda_1}{(n+1)\lambda_1 - (\sqrt{\mu_c} - \sqrt{\mu_1})^2}. \quad (34)$$

The comparison between equilibrium and social optimal behavior is shown in Figure 2.

As can be seen from Figure 2, when the processing speed of the big data cloud platform is lower than the local processing speed, it reaches a certain threshold, and all tasks will be processed locally by default. If the local processing speed is lower than the processing speed of the big data cloud platform, it can be processed through the cloud platform, which can fully deal with inefficient processing, thus improving social utility. The results provide a basis for IaaS cloud to allocate resources and improve social utility under the condition of limited resources.

## 2. Virtual Simulation Management of Cloud Platform Data Traffic Optimization Based on Multipoint Mapping Algorithm

**2.1. Partition Calculation of Shunting Tasks.** For the data diversion of big data cloud platform, firstly, all sample data need to be statistically analyzed to classify the current data flow, so as to realize virtual simulation management and calculate the tasks of current subunits, so as to obtain the corresponding dynamic priority tasks. The specific process is described as follows.

According to the data flow corresponding to the big data cloud platform, the traffic data of the subunit are counted, as shown in the following formula:

$$c = [c(0), c(1), \dots, c(e-1)]^k. \quad (35)$$

Calculate the total platform data traffic diversion task volume, as shown in the following formula:

$$\hat{s} = \text{arc min}_{q \in \varepsilon} \sum_{s=1}^{+\infty} H(\hat{s}, s) g(s|c), \quad (36)$$

where  $H(\hat{s}, s)$  represents the cost function in the shunting task and  $\varepsilon$  represents the set of all subtasks in the shunting task, as shown in the following formula:

$$\varepsilon = \{\hat{s} | c_1 + 2c_r \leq \hat{s} \leq S\}, \quad (37)$$

Use (38) to calculate its cost function, as follows:

$$H(\hat{s}, s) = (\hat{s}, s) = (\hat{s} - s)^2. \quad (38)$$

Assuming that the shunting time meets the condition of  $\sum_{s=1}^s \hat{s}(s|c) = 1$ , the estimation function can be obtained, as shown in the following formula:

$$H(\hat{s}, s) = |\hat{s} - s|. \quad (39)$$

Substituting (39) into (37), we can obtain the following results:

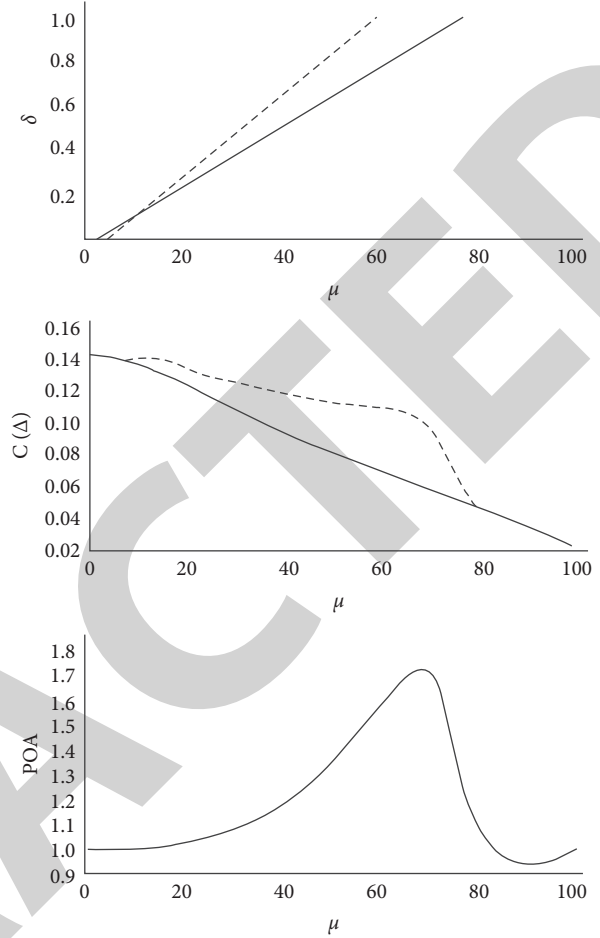


FIGURE 2: Comparison between equilibrium and social optimal behavior ( $\mu_1 = 10$ ,  $\lambda_1 = 3$ , and  $n = 20$ ).

$$\hat{s} = \text{arc min}_s \left( \sum_{s=1}^s s(s|s) - \sum_{s=s}^s s(s|c) \right). \quad (40)$$

The calculation of subtask volume in the process of platform data traffic diversion is realized, as shown in the following formula:

$$s = \text{arc max}_s (\bar{s} | c). \quad (41)$$

To sum up, through the statistical analysis of the task volume of the subunits of the big data cloud platform, the corresponding dynamic priority tasks are obtained, which provides a basis for data traffic optimization and virtual simulation management.

**2.2. Calculation of the Dynamic Priority of Shunting Tasks.** In the process of optimal diversion of platform data traffic, the specific process is detailed as follows.

If  $st_{ik}$  is the  $k$ th priority regularization processing result value to be processed by  $t_i$  of the platform data, it is calculated using the following equation:

$$st_{ik} = \frac{(z_{ik} - \bar{z}_k)}{\delta_k}, \quad (42)$$

where  $k = 1, 2$ ;  $\bar{z}_k = 1/n \sum_{i=1}^n z_{ik}$ ; and  $\bar{z}_k$  represents the average value of column  $K$  of matrix  $Z$ , as shown in the following formula:

$$Z = \begin{Bmatrix} z_{11} & z_{12} \\ \vdots & \vdots \\ z_{n1} & z_{n2} \end{Bmatrix} = \begin{Bmatrix} \text{TVD}_1 & \text{UTE}_1 \\ \vdots & \vdots \\ \text{TVD}_n & \text{UTE}_n \end{Bmatrix}. \quad (43)$$

Use (44) to calculate the dynamic priority of platform data traffic diversion task:

$$\text{DP}(t_i) = \omega_1 \times st_{i1} + \omega_2 \times at_{i2}, \quad (44)$$

where  $\omega_1, \omega_2 \in [0, 1]$  is the weight factor and meets  $\omega_1 + \omega_2 = 1$ .

It is assumed that the traffic data processing priority of the platform is higher and the following constraints need to be met:

$$h(\theta_1, \theta_2, \dots, \theta_q) = 1. \quad (45)$$

Use (46) to establish the platform data flow diversion model:

$$\min \varphi = \sqrt{\sum_{i=1}^n (\theta_i - \omega_i j_i)^2}. \quad (46)$$

**2.3. Establishing Cloud Platform Data Traffic Optimization Management Model.** For the establishment of cloud platform data traffic optimization management model, the specific process is detailed as follows.

It is assumed that in the  $d$ -dimensional network traffic data space, the velocity vector and position vector of particle  $I$  are represented by (47) and (48), respectively.

$$v_i = [v_i^1, v_i^2, \dots, v_i^D], \quad (47)$$

$$x_i = [x_i^1, x_i^2, \dots, x_i^D], \quad (48)$$

where  $I$  represents the particle number, the current optimal position vector of each particle is (pbest), and the global optimal vector is (gbest). The near optimal solution is obtained by constantly searching for the optimal solution by updating (49) and (50):

$$v_i^{k+1} = wv_i^k + c_1 \text{rand}(\text{pbest}_i - x_i^k) + c_2 \text{rand}(\text{gbest}_i - x_i^k), \quad (49)$$

$$x_i^{k+1} = x_i^k + v_i^{k+1}, \quad (50)$$

where  $c_1$  and  $c_2$  represent the particle learning factor and  $\text{rand}()$  represents the random number of  $[0, 1]$ . The current optimal position of the particle is applied to the current particle position, and then the particle position is adjusted according to the global optimal position gbest, as shown in the following formula:

$$\begin{cases} X_i = S(\chi \cdot M_a^b(X_i), \text{pbest}_i), \\ X_i = S(X_i), \text{gbest}. \end{cases} \quad (51)$$

Among them,  $\chi$  represents the value range and  $M_a^b(X_i)$  is the variogram, which reflects that the value of component  $a$  in vector  $X_i$  is updated to  $b$ . The meaning of  $\delta \cdot M_a^b(X_i)$  is expressed by

$$\chi \cdot M_a^b(X_i) = \begin{cases} M_a^b(X_i), & \rho \leq x, \\ X_i, & \text{others}. \end{cases} \quad (52)$$

Establish a cloud platform data flow optimization management model, which is expressed by

$$F(X_i) = \min T_s. \quad (53)$$

### 3. Simulation Results and Analysis

In order to further prove the effectiveness of the multipoint mapping algorithm and build the corresponding virtual simulation platform, Figure 3 shows the delay of data traffic management of big data cloud platform through different models. On the one hand, for the virtual simulation platform, the corresponding data traffic statistics can be obtained to obtain the corresponding data model, so as to achieve low average end-to-end delay.

This model and the existing model are used for big data cloud platform data traffic management, respectively, and the packet switching rate (%) of three different models for big data cloud platform data traffic management is compared. The comparison results are shown in Figure 4.

As shown in Figure 4, firstly, classify the amount of data traffic diversion subtasks of the network platform in the current state, calculate the amount of subtasks in the process of data traffic diversion of the current platform, and obtain the dynamic priority task of the platform data traffic diversion task. The packet switching rate of big data cloud platform data traffic management based on the model in this paper is low.

The model in this paper and the existing model are used for data traffic management of big data cloud platform, respectively. The comparison results are shown in Figure 5.

As shown in Figure 5, the data traffic management model of big data cloud platform is established by using the optimization results, so that the throughput of data traffic management of big data cloud platform in this model is high.

However, the storage time of decomposition using this algorithm is significantly less than that of traditional algorithms, which fully shows the advantages of this algorithm.

The traditional algorithm is used for network sudden change traffic decomposition management, and the obtained data are sorted and analyzed. The results are shown in Figure 6.

The multipoint mapping algorithm is used for network sudden change traffic decomposition management, and the obtained data are sorted and analyzed. The results are shown in Figure 7.

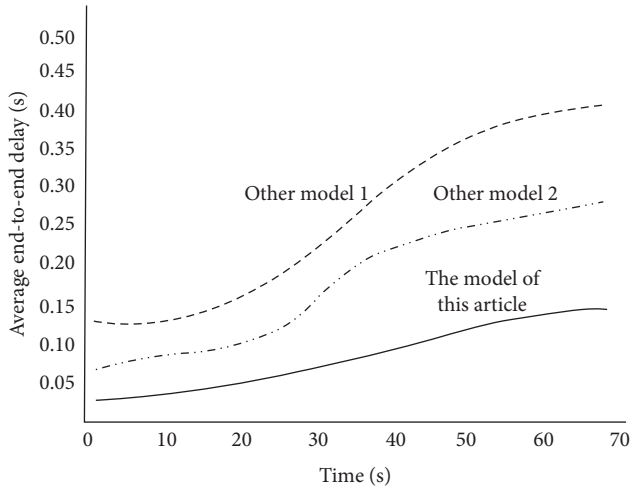


FIGURE 3: Comparison of average end-to-end delay of different models.

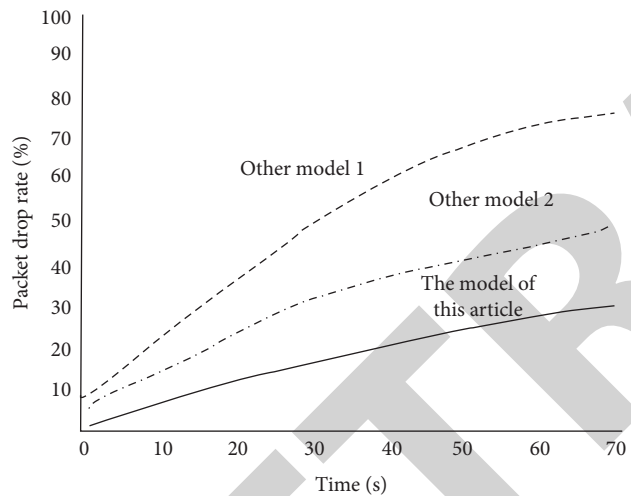


FIGURE 4: Comparison of packet switching rates of different models.

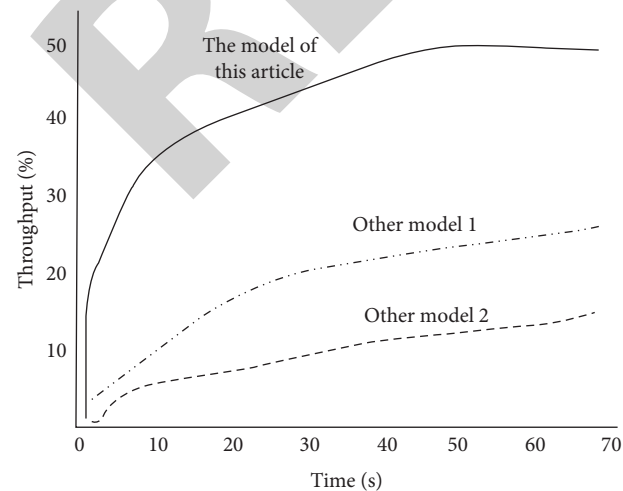


FIGURE 5: Throughput comparison of different models.

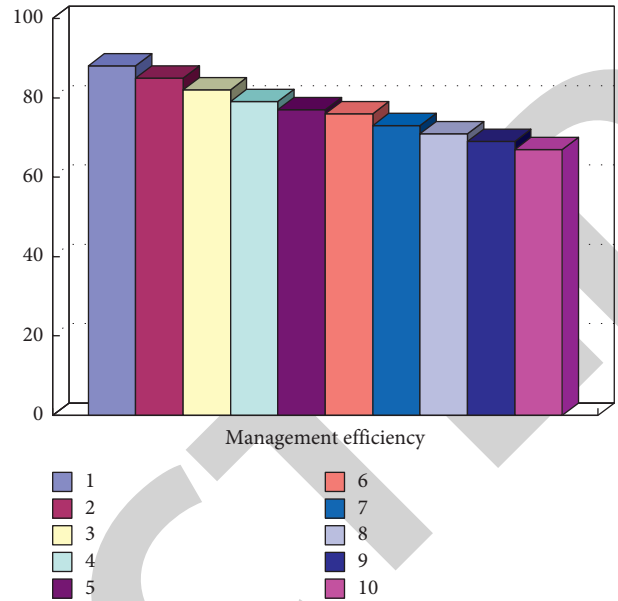


FIGURE 6: Experimental data table of traditional algorithm.

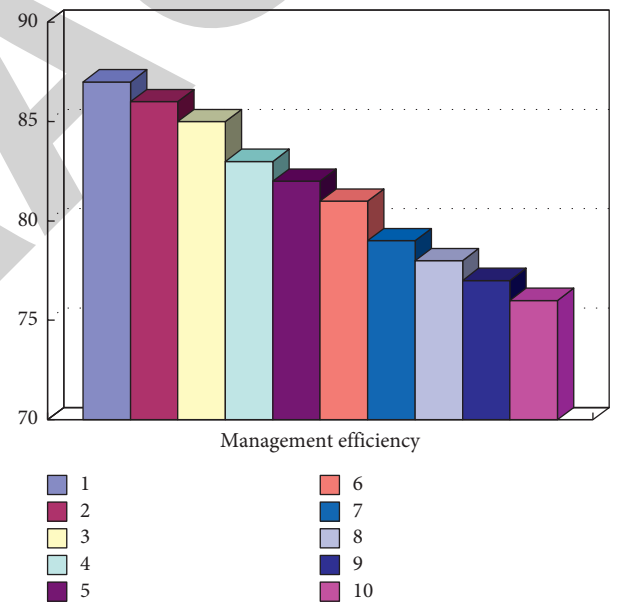


FIGURE 7: Experimental data table of multipoint mapping algorithm.

By comparing the results in Figures 6 and 7, using the multipoint mapping algorithm to manage the traffic of big data cloud platform can greatly improve the management efficiency, save corresponding time, and meet the needs of users.

#### 4. Conclusions

With the continuous enrichment and improvement of cloud computing platform, how to effectively ensure the stability of big data platform is extremely important. This paper attempts to introduce the multipoint mapping algorithm, comb the data traffic business of the big data cloud platform,



try to build the data traffic optimization management model, carry out statistical calculation for the data diversion task, analyze and process the priority indicators, and form the final results through continuous iteration, in order to realize the optimized virtual simulation management of the data traffic of the big data cloud platform. Simulation results show that the multipoint mapping algorithm is effective and can effectively support the data flow of big data cloud platform and optimize the management of virtual simulation.

## Data Availability

The data used to support the findings of this study are available upon request to the author.

## Conflicts of Interest

The author declares that there are no conflicts of interest.

## References

- [1] L. Zhang, F. Zhang, W. Yu, L. Sijie, D. Yuming, and L. Cheng, "Optimization and application of flow characteristics of steam turbine valve based on big data," *IOP Conference Series: Materials Science and Engineering*, vol. 592, no. 1, pp. 905–918, 2019.
- [2] B. Zhang, "Optimization of FP-growth algorithm based on cloud computing and computer big data," *International Journal of System Assurance Engineering and Management*, vol. 12, no. 4, pp. 853–863, 2021.
- [3] S. Danthuluri and S. Chitnis, "Energy and cost optimization mechanism for workflow scheduling in the cloud," *Materials Today: Proceedings*, vol. 197, no. 2, pp. 110–116, 2021.
- [4] D. Nallaperuma, R. Nawaratne, T. Bandaragoda et al., "Online incremental machine learning platform for big data-driven smart traffic management," *IEEE Transactions on Intelligent Transportation Systems*, vol. 2, no. 99, pp. 1–12, 2019.
- [5] T. Li, "Big data storage optimization and parallel processing technology for power equipment surveillance under cloud platform," *Journal of Computational Methods in Science and Engineering*, vol. 19, no. 1, pp. 1–8, 2019.
- [6] G. Kougka and A. Gounaris, "Optimization of data flow execution in a parallel environment," *Distributed and Parallel Databases*, vol. 37, no. 1, pp. 1644–1648, 2019.
- [7] L. S. Subhash and R. Udayakumar, "Sunflower whale optimization algorithm for resource allocation strategy in cloud computing platform," *Wireless Personal Communications*, vol. 116, no. 4, pp. 3061–3080, 2021.
- [8] Z. Wa Ng, M. Wa Ng, and W. Bao, "Development and application of dynamic timing optimization platform for big data intelligent traffic signals," *E3S Web of Conferences*, vol. 136, no. 4, pp. 287–295, 2019.
- [9] R. Sousa, M. Pereira, F. M. Q. Pereira, and G. Araujo, "Data-flow analysis and optimization for data coherence in heterogeneous architectures," *Journal of Parallel and Distributed Computing*, vol. 130, no. 8, pp. 126–139, 2019.
- [10] L. Jian, B. Yda, B. Ywa, R. Chen, L. Chen, and G. Chen, "Information flow perception modeling and optimization of internet of things for cloud services," *Future Generation Computer Systems*, vol. 115, no. 8, pp. 671–679, 2021.
- [11] T. J. Hsieh, "Data-driven oriented optimization of resource allocation in the forging process using bi-objective evolutionary algorithm," *Engineering Applications of Artificial Intelligence*, vol. 89, no. 3, pp. 1–12, 2020.
- [12] N. Ahmed, M. Levorato, R. Valentini, and G.-P. Li, "Data driven optimization of energy management in residential buildings with energy harvesting and storage," *Energies*, vol. 103, no. 2, pp. 23–29, 2020.
- [13] D. Mak, D. Choeum, and D. H. Choi, "Sensitivity analysis of volt-VAR optimization to data changes in distribution networks with distributed energy resources," *Applied Energy*, vol. 261, no. 4, pp. 1–12, 2020.
- [14] A. Marchelak, M. A. Olszewska, and A. Owczarek, "Data on the optimization and validation of HPLC-PDA method for quantification of thirty polyphenols in blackthorn flowers and dry extracts prepared thereof," *Data in Brief*, vol. 29, no. 4, pp. 1–8, 2020.
- [15] Z. Zhou and L. Zhao, "Cloud computing model for big data processing and performance optimization of multimedia communication," *Computer Communications*, vol. 160, no. 5, pp. 1–9, 2020.
- [16] J. Song, Z. Ma, R. Thomas, and G. Yu, "Energy efficiency optimization in big data processing platform by improving resources utilization," *Sustainable Computing: Informatics and Systems*, vol. 21, no. 3, pp. 80–89, 2019.
- [17] A. Kushwaha and M. Amjad, "A particle swarm optimization based load scheduling algorithm in cloud platform for wireless sensor networks," *Scalable Computing: Practice and Experience*, vol. 20, no. 1, pp. 71–82, 2019.
- [18] H. Zhou, C. Yang, and Y. Sun, "Intelligent ironmaking optimization service on a cloud computing platform by a digital twin," *Engineering*, vol. 70, no. 4, pp. 249–256, 2021.
- [19] S. Hou, W. Ni, S. Zhao, B. Cheng, S. Chen, and C. Junliang, "Decentralized real-time optimization of voltage reconfigurable cloud computing data center," *IEEE Transactions on Green Communications and Networking*, vol. 5, no. 3, pp. 46–56, 2020.
- [20] A. K. Sangaiah, A. Goli, E. B. Tirkolaei, M. Ranjbar-Bourani, H. M. Pandey, and W. Zhang, "Big data-driven cognitive computing system for optimization of social media analytics," *IEEE Access*, vol. 5, no. 99, pp. 1–10, 2020.