# Optimization and Implementation of the Spectrum Management and Optimization Algorithm in the Distributed Computing Platform

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Abstract: With the wide application of distributed computing platform, the application of spectrum management and optimization algorithm in distributed computing platform has also been paid attention to. Therefore, this paper carries out in-depth research on the application of spectrum management and optimization algorithm in distributed computing platform. First of all, the spectrum management and optimization algorithm is introduced, and the initial model of spectrum management features and spectrum management features of the distributed computing platform samples are extracted to realize the application analysis of spectrum management and optimization algorithm in the distributed computing platform. Then, the spectrum management and optimization algorithm is used to design the distributed computing platform, build the distributed computing platform of spectrum management and optimization algorithm, and complete the application of spectrum management and optimization algorithm in the distributed computing platform. The simulation experiment results show that the application accuracy of the proposed algorithm is significantly improved, and the stability of the application effect is better, which can effectively solve the problems of low accuracy and low practice rate in the current application, and has certain practical value.



## 1 INTRODUCTION

With the promotion and use of distributed computing platforms, the executors have higher and higher requirements for distributed computing platforms(Ejarque, Domínguez, et al. 2019), (George, Raghavan, et al. 2005), but it will also lead to the quality of distributed computing platforms into various problems and difficult application implementation. In fact, the types of distributed computing platforms are diverse and coupled, and the distributed computing platforms are in urgent need of comprehensive optimization strategies to conduct spectrum management of the distributed computing platforms to prevent the waste of distributed computing resources (Guan, De, et al. 2019), (Huang, Guo, et al. 2017). The construction of the distributed computing platform is mostly laid in a controllable environment, while the distributed computing platform plays a role in frequency band management according to the basic data set (Jindal, Gerndt, et al. 2021), (Liu, Zhu, et al. 2019), (Lv, 2020). However, there are some problems in the application of distributed computing platform, which bring obstacles to the use of distributed computing platform. Therefore, this paper studies the application of spectrum management and optimization algorithm in distributed computing platform, and verifies the effectiveness of the proposed method (Naranjo, Cores, et al. 2013), (Tang, Jiang, et al. 2020), (Vonschilling, Levis, et al. 1995).

## 2 RELATED WORKS

At present, many experts have studied the application of spectrum management and optimization algorithm in the distributed computing platform, and also put forward some research results. Using the traditional sequence framework of spectrum in distributed computing platform management and optimization algorithm, the network framework for spectrum information acquisition ability is poor, has certain limitations, therefore, according to the shortcomings of traditional platform design and implementation, build distributed computing platform spectrum



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model, the spectrum mechanism and combination, by combining the application algorithm of spectrum management and optimization algorithm application system, thus improving the accuracy of the distributed computing platform spectrum management and optimization algorithm application.

The simulation experiment results show that the accuracy of the proposed algorithm is improved to different degrees compared with other algorithms, which proves that the overall performance of the proposed algorithm is better, but the method has the problem of poor practicability. Establishment of distributed computing platform based on spectrum management and optimization algorithm, and implementation, by the spectrum based on management and optimization algorithm in the supervision stage, obtain the characteristics of the distributed computing platform application sample, the application information into the distributed computing platform, optimize the extraction effect of the spectrum vector characteristics, the spectrum management and optimization algorithm application characteristics into the distributed computing platform, realize the spectrum management and optimization algorithm application results. The experimental results show that the constructed distributed computing platform can accurately apply the information, and the application spectrum and the amount of information will not interfere with the distributed computing platform. The use effect of the distributed computing platform is good, but there are still some limitations.

Put forward based on spectrum management and optimization algorithm, first of all, the distributed platform application system network architecture design, establish spectrum management mapping model analyzes the spectrum characteristics, the spectrum management characteristic information clustering and judge the characteristic attributes, realize the spectrum management and optimization algorithm application characteristic analysis, complete the distributed computing platform spectrum management and optimization algorithm application. Through simulation experiment, it is proved that the platform can obtain the optimal solution application, but there is the problem of poor application accuracy.

## 3 METHODS

In order to ensure that the distributed computing platform in spectrum management and optimization algorithm application accuracy, using, spectrum management and optimization algorithm, based on the acquisition of distributed computing platform application information with spectrum management information, build spectrum management and optimization algorithm of distributed computing platform sample spectrum management characteristics model. Before the application of the spectrum management and optimization algorithm, import the correlation feature mapping between the information spectrum management and the reorganization of the related feature parameters, and obtain the feature correlation calculation of the spectrum management feature model of the application information of the collected spectrum management and optimization algorithm, as shown in formula (1):

$$Z = X(\frac{\mathrm{C}}{2} + V)^2 \tag{1}$$

In the formula, X represents the balance coefficient of the spectrum management feature information collected by distributed computing platform, C represents the constant of the analytical adaptation of the spectrum management feature information collected by distributed computing platform, and V represents the density set of the total application of the spectrum management feature information collected by distributed computing platform.

In distributed computing platform application spectrum management characteristics under the condition of fuzzy, through the fusion model can draw the correlation coefficient space information distribution characteristics, the application spectrum management information analysis can obtain correlation coefficient space mapping index, under the correlation coefficient space with linear relationship, can get the distribution weight control function, as shown in the formula (2):

$$A = \frac{(S+D) - F\sqrt{G}}{(S-D)^2} \tag{2}$$

Formula, S represents the characteristic coefficient of information corresponding model coefficient, D represents the spectrum management features of mapping reorganization features, F represents spectrum management and optimization algorithm application features of the initial quantity, G represents, distribution mapping index, thus the

distributed computing platform application mapping function model, as shown in the formula (3):

$$S = \frac{\log_k (D+F)+1}{\log_k H} \tag{3}$$

In the formula, D represents the amount of map reorganized by the spectrum management feature, F represents the initial amount of features applied by the spectrum management and optimization algorithm, and H represents the amount of spectrum management features informative in the application of the spectrum management and optimization algorithm. In the information component processing feature fusion mechanism, obtain the initial spectrum management features of the component set, according to the correspondence of spectrum management mapping, introduce the characteristics of the component space sequence, the characteristics of application information parameters feature fusion, get the initial characteristic model expression, as shown in the formula (4):

$$Q = WE + \frac{R}{T} \tag{4}$$

In the formula, W represents the spectrum management and optimization algorithm features sequence corresponding information component correlation distribution set, E represents the current spectrum management and optimization algorithm application information characteristic parameter distribution set, R / T represents the distribution coefficient of spectrum management and optimization algorithm application features fusion, by feature analysis after the cluster extraction, and get the matrix of spectrum management and optimization algorithm application spectrum management features the initial model output, as shown in the formula (5):

$$R = \begin{bmatrix} r^0 & r^0 & r^0 & \cdots & r^0 \\ r^0 & r & r^2 & \cdots & r^{k-1} \\ r^0 & r^2 & r^4 & \cdots & r^{2(k-1)} \\ \vdots & \vdots & \vdots & \vdots & \vdots \\ r^0 & r^{k-1} & r^{2(k-1)} & \cdots & r^{(k-1)^2} \end{bmatrix} \tag{5}$$

In the formula, R represents the initial coefficient of the feature information association of the imported spectrum management corresponding to the optimization algorithm. Based on the above analysis of the spectrum management characteristics of the spectrum management and optimization algorithm in the distributed computing platform, the conditional probability of the spectrum management and optimization algorithm can be obtained according to the state of the distributed computing platform, as shown in formula (6):

$$S(D_j \mid D_{j-1}, G) = F(H_j) \tag{6}$$

In the formula, S represents the model coefficient corresponding to the characteristic coefficient of information, D represents the recombination feature of the spectrum management feature, G represents the distribution mapping index, F represents the comprehensive model applied by the spectrum management and optimization algorithm, as shown in formula (7):

$$Z_j = X(C_{j-1}, V_{j-1}) \tag{7}$$

In the formula, X represents the basic factor of using the spectrum management and optimization algorithm, C represents the output of the known distributed computing platform information, and V represents the distributed spectrum factor of the applied output information. Using the expansion vector conversion, it is concluded that the information source input applied by the spectrum management and optimization algorithm is the data source, as shown in formula (8):

$$R = \{r_1, r_2, r_3, \cdots, r_n\} \tag{8}$$

In the formula, R represents the information volume applied by the spectrum management and optimization algorithm. In the initial stage of application, the information data source is applied to develop the optimization model to obtain the corresponding information, as shown in formula (9):

$$R_{ij} = \frac{T_*}{Y_k} \bullet (I \times I_i) P \tag{8}$$

In the formula, $T$ represents the basic criteria for the application of spectrum management and optimization algorithm, $Y$ represents the feature module of spectrum management, $I$ represents the set of information sources, $P$ represents the information sources after segmentation, and $R$ represents the sequence of applied information. Define the information applied to the spectrum management and optimization algorithm, and select the information set of the spectrum management and optimization algorithm, as shown in formula (10):

$$W_{aw} = \frac{E_i \bullet R(T)}{Y(U)} \times PS(g) \quad (8)$$

In the formula, *ER(T)* represents, the supplementary component of frequency spectrum management and optimization algorithm application, *Y(U)* represents the number of frequency spectrum management applied by frequency spectrum management and optimization algorithm, *PS (g)* represents, and the frequency spectrum information identified.

## 4 RESULTS AND DISCUSSION

In order to verify the effectiveness of the application of spectrum management and optimization algorithm in the proposed distributed computing platform, the simulation experiment is conducted, and the experimental environmental parameters are shown in Table 1.

Table 1: The experimental environmental parameters.

| Parameter | content |
|---|---|
| Distributed computing platform | 342.162.12 |
| Spectrum management and optimization algorithm | 315.264.25 |
| Basic platform environment | 367.261.42 |
| Information collection processing | 409.136.12 |

As shown in Table 1, the application test experiment of spectrum management and optimization algorithm of distributed computing platform must pay attention to the randomness of the selection of test objects. In order to ensure the accuracy of this study, the research objects must be limited, as shown in Table 2.

According to the parameter setting in Table 2, the spectrum management and optimization algorithm application test of the distributed computing platform is used, and the application data of the platform are tested. The comparison results are shown in Figure 1.

Table 2: Detailed settings of the analyzed data.

| Category of tests | Types of spectrum management applications | monitoring parameter |
|---|---|---|
| Distributed computing platform A frequency spectrum | 3621 | $0.225\times100^{-3}$ |
| Distributed computing platform B frequency spectrum | 3516 | $0.215\times100^{-3}$ |
| Distributed computing platform C frequency spectrum | 3529 | $0.225\times00^{-3}$ |
| Distributed computing platform D-spectrum | 3606 | $0.215\times100^{-3}$ |
| Distributed computing platform E spectrum | 3597 | $0.225\times100^{-3}$ |

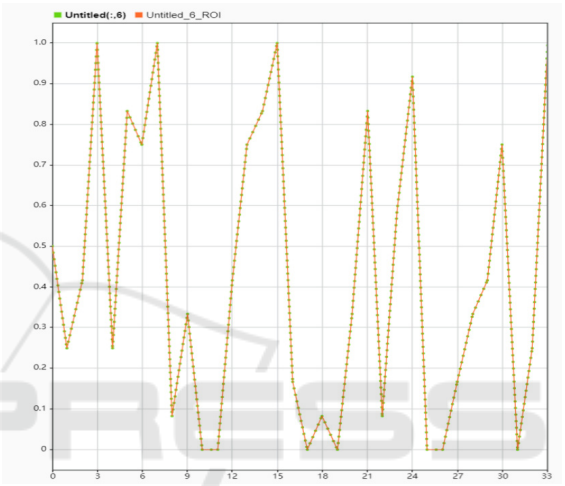


Figure 1: Convergence curve for the application of the spectrum management and optimization algorithm.

Distributed computing platform in spectrum management and optimization algorithm application the distribution of data sources, can effectively reflect the application results and link between spectrum management, spectrum, distribution is relatively loose, means the application data source and spectrum management does not fit, spectrum distribution, application data source and spectrum management, spectrum information more coherent. Based on the analysis of Figure 1, it can be seen that the spectrum management and optimization algorithm proposed in this paper has better accuracy of spectrum information capture, the application structure is more coherent, and more in line with the requirements of spectrum management. This shows that the proposed algorithm has more practical value. Taking the amount of spectrum information as an independent variable, the proposed application algorithm is used to test the speed of distributed computing platform application. The spectrum information matching rate of the proposed applied

algorithm is compared, and the comparison results are shown in Figure 2.

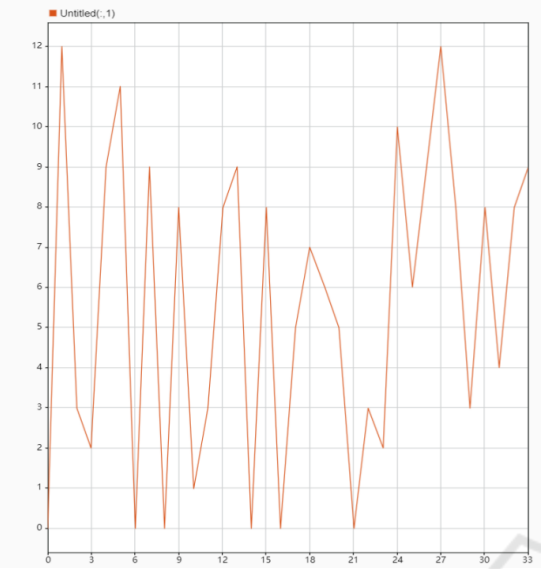


Figure 2: Comparison of the applied matching curves for the different algorithms.

It can be analyzed from figure 2, based on spectrum management and optimization algorithm of frequency data statistics, although not get the complete spectrum information, the spectrum management and optimization algorithm application speed control, with the increase of the number of information and gradually slow, the overall performance of the application algorithm is better than traditional algorithm, but because not extract the spectrum management characteristics of distributed computing platform, the spectrum management and optimization algorithm application become more complicated. The proposed spectrum management and optimization algorithm is combined with the advantages of other traditional algorithms to accelerate the application of the spectrum management and optimization algorithm in the distributed computing platform are shown in Fig. 2.

As can be seen from Figure 3, the matching degree of the application process of spectrum management and optimization algorithm in the distributed computing platform is used to analyze the application of the proposed spectrum management and optimization algorithm. Regardless of the spectrum information matching application, the matching degree change range and distribution range are better than the traditional algorithm. This shows that the spectrum management and optimization algorithm proposed in this paper is applied to the spectrum management and optimization algorithm in the distributed computing platform, which can ensure the stable output of the application effect, and the overall control effect is optimal.

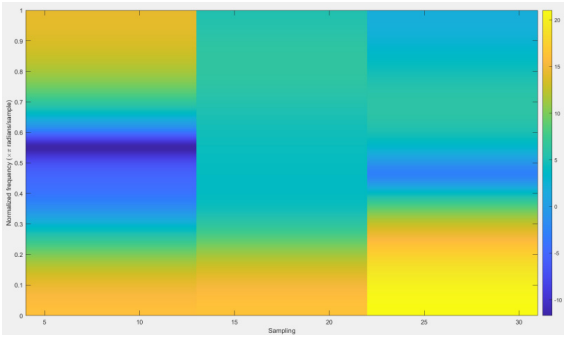

Figure 3: Comparison of matching degree between spectrum management and optimization algorithm in distributed computing platform

## 5 CONCLUSIONS

In summary, for the application analysis of spectrum management and optimization algorithm in distributed computing platform, this paper conducts in-depth research on the application of spectrum management and optimization algorithm in distributed computing platform. Firstly, the spectrum management and optimization algorithm is introduced, and the initial model and spectrum management feature of the distributed computing platform are extracted to complete the application analysis of the spectrum management and optimization algorithm in the distributed computing platform. Then, the spectrum management and optimization algorithm is used to comprehensively design the distributed computing platform to build a scientific and accurate distributed computing platform. The results of the simulation experiment show that the proposed algorithm based on spectrum management and optimization can improve the application effect of distributed computing platform, and the overall stability and better, effectively improve the accuracy and practice rate of spectrum information management application. Therefore, it is necessary to optimize and realize the spectrum management and optimization algorithm in the distributed computing platform.

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