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Network Scheduling Model of Cloud Computing

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Abstract. The paper proposed a network scheduling in cloud computing based on intelligence Particle Swarm Optimization algorithm aimed at the disadvantages of cloud computing network scheduling. And the results showed, compared with traditional intelligence Particle Swarm Optimization algorithms, the improved algorithm can preferably allocate the resources in cloud computing model, the effect of prediction model time is more close to actual time, can efficiently limit the possibility of falling into local convergence, the optimal solution's time of objective function value is shorten which meet the user's needs more.

Keywords: Network Computing, Particle Swarm Optimization Algorithm, Network Scheduling

1 Introduction

In cloud computing, the allocation of resources is a very important issue, the unsatisfactory allocation of resources can easily led the cloud's servers crashed and other servers in idle. So in cloud environment, the problem mostly need to solve is the ways to control any server's resources allocation and use condition by the information communication of local and in the Internet to make better use of the resources. Literature [1] made researches of the resources allocation conditions in different environment. Literature [2] proposed the resources allocation mechanism of self-management, self-adjustment and self-protection. Literature [3-5] proposed a resources allocation system applies to extensive distributed system, which efficiently increased the system's service quality under cloud computing.

Cloud computing is a combination of parallel computing, distributed computing and virtual technology, a hot technology of nowadays computer industry. The cloud system firstly combined computer, storage device and so on and formed resources pool, then the users could choose the corresponding resources by their needs, this dynamically offers users a computing service environment with reliable and ensure quality of service(QOS). Network scheduling is one of the core technologies of cloud computing which has big effect on the whole performance of cloud computing [6].

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2 Description Process

The cloud model is a transformation model uses linguistic values to express the uncertainty between a certain conception and its quantification expression, it fully combines fuzziness and randomness and forms the mapping between qualitative and quantification, shows in figure 1.

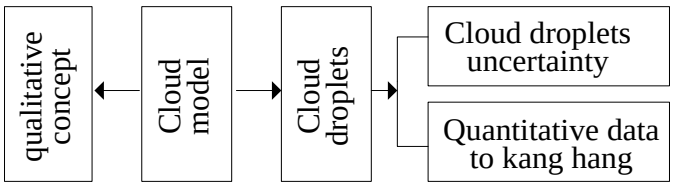

Fig. 1. Transformation schematic of cloud mode's with qualitative concept

Sets U is discourse domain expressed by accurate numerical value, A is corresponding qualitative concept in U. If quantitative value $x \in u$ and x is a random implementation with likely normal distribution of qualitative concept A in discourse domain U, the certainty degree $A(x) \in [0,1]$ of x to A is also a random number with likely normal distribution, then data array $(x, A(x_i))$ is called as cloud drop, the whole element $x_i \left(i = 1, 2...n\right)$ in discourse domain U and its certainty degree $A(x_i)$ for A, i, e , n data array $(x, A(x_i))$, forms the cloud model with n cloud drop, calls x distribution in discourse domain U as cloud distribution. The number characteristics of cloud model are expressed as expectation (Ex), entropy (En) and excess entropy (He). Among them, expectation (Ex) refers to the central value of discourse domain U, is the center of qualitative concept, reflects the cloud focus of the whole cloud drop swarm; entropy (En) refers to the range which can be received by fuzzy concept, $En \succ 0$; excess entropy (He) is a uncertain measurement of entropy, i, e , the excess entropy is the entropy's entropy, He >0. The excess entropy reflects the degree of reach an agreement of cloud drop of representation qualitative concept or the concentration degree of cloud drop's representation qualitative concept; the bigger excess entropy is, the qualitative concept has worse common sense or the qualitative concept is worse decentralization.

3 Camera parameters calibration based on Quantum Particle Swarm Optimization.

Particle Swarm Optimization is a meta heuristic algorithm proposed in the inspired by the foraging behavior of birds. Particle swarm optimization transforms the optimization problems which need to be solved into the foraging birds flying in the air,

compare the particle in the algorithm to the birds in the population. The birds which are flying around for food in the model are just like the particle which are searching in the solution space, the position of one of the birds is a solution of the optimization problem to solve, and the food in the model is the optimal solution of the practical optimization problem . Because the particle in the PSO could not avoid falling into local optimal, and if the parameter isn't fit in the operation process will cause the algorithm to produce the "premature" phenomenon, so the algorithm convergence is not up to the global minimum point and it has lower robustness. Based on the PSO algorithm, researchers proposed quantum particle swarm optimization (QPSO) algorithm on the basis of Quantum mechanics theory. In this paper, we use the improved quantum behaved particle swarm optimization algorithm to optimize the parameters of camera calibration.

Relate the camera parameters optimization calibration and QPSO by fitness function, express the camera calibration parameters as some factors of influence function, search for the best combination of influence by the evaluation of the fitness of each particle in the particle swarm to achieve the solution of optimization problems. In this article, all the camera parameters to be solved are optimization target, the particles in the population constituted by using the parameters to be optimized can be defined as

$$\mathbf{x} = \begin{Bmatrix} f, u_0, v_0, k_1, k_2, k_3, p_1, p_2, b_1, b_2, \\ \omega, \varphi, \kappa, t_x, t_y, t_z \end{Bmatrix} \tag{1}$$

The fitness function F can be described as

$$F = \frac{1}{m}\sum_{i=1}^{m}\sqrt{\left[u_i - u_i'(\mathrm{x})\right]^2 + \left[v_i - v_i'(\mathrm{x})\right]^2} \tag{2}$$

In the formula, m is the number of the calibration reference points, μ_i and ν_i is the pixel coordinates of the ith reference point, μ_i and v_i is the estimated value calculated according to the camera model.

4 Experimental results

In order to prove the performance of this algorithm, tests in two aspects, one is the performance of algorithm, the other is the network scheduling in cloud computing.

Makes comparison test using three benchmark function in literature and to test the algorithm's efficiency and performance. Using of MATLAB in Windows.

Respectively tests 10 times of three functions and gets the best solution, worst solution and the average value. According to make compare with basic Particle Swarm Optimization algorithm, the results is as table 1, it is the convergence curve

comparison between the algorithm in this text and intelligence Particle Swarm Optimization algorithm in three functions.

Table1. Comparison of testing function

function	algorithm	the best solution	the worst solution	average
Sphere function	intelligence Particle Swarm Optimization algorithm	0.0212501	0.0298742	0.0255600
	algorithm in this text	0.0019610	0.0105412	0.0062476
Goldstein-Price function	intelligence Particle Swarm Optimization algorithm	3.0005126	3.0014521	3.0009822
	algorithm in this text	3.0000003	3.0000301	3.0000112
ACKELY function	intelligence Particle Swarm Optimization algorithm	3.4589131	3.6521469	3.5565298
	algorithm in this text	3.2456321	3.3562153	3.3109179

From table 1, the improved Particle Swarm Optimization algorithm is obviously better than intelligence Particle Swarm Optimization algorithm no matter in the best solution, the worst solution or the average.

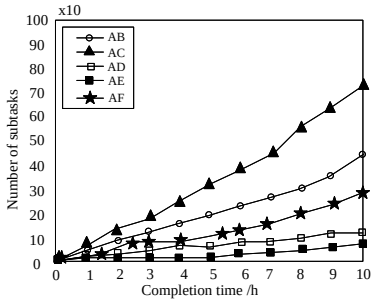

Fig. 2. Network and complementing time of intelligence Particle Swarm Optimization algorithm

with the increasing number of sub-network, the algorithm in this text has certain advantages in network average transmission time and execution time. Mainly because the improved intelligence Particle Swarm Optimization algorithm can better distributes the resources in the model, prediction model time and effect is gradually close to actual time. As shown in figure 2

5 Conclusion

How to make full use of the resources in cloud computing environment is a current-focusing problem. The method in this text improved the intelligence firefly algorithm in nature, combined the number of sub-task, resources with algorithm. In intelligence firefly algorithm, improved the method of firefly's fluoresce in position so as to make the firefly find the better object faster. On this improvement, the method reasonable solved the problem of balancing the network load and extending network, enhanced the global convergence of algorithm, it's valuable for increasing network operation. But there are still many practical problems in cloud computing to solve, resources distribution in cloud computing needs to be further researched.

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