IJBPAS, September, 2015, 4(9), Special Issue: 197-207

ISSN: 2277–4998

International Journal of Biology, Pharmacy and Allied Sciences (IJBPAS)

'A Bridge Between Laboratory and Reader'

www.ijbpas.com

PROPOSITION A NEW METHOD BY USE OF CELL LEARNING AUTOMATA FOR SEARCHING THE APPROPRIATE SEVER IN GRID SYSTEMS

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ABSTRACT

One of the main goals in grid systems is increase the possibility of access to sources by optima's cost and low time. The discovery of source in grid is rated as main problem in this system. Different methods have been proposed for solution the problem of sources discovers in grid system. But none couldn't coordinate themselves to changes in grid . Thus, it is necessary that proposed the this study, has been suggested a new algorithm for searching the appropriate server in grid system by use of learning automata in according to compatible of learning automata to active environment such as grid, the best option for select the necessary source is this new algorithm in grid system. In according to simulation the proposed algorithm, we use from omnet^{++} 4.2.2 software. The conclusion of simulation shows that the proposed algorithm has more proficiency than other algorithm.

Keywords: Grid system, Learning Automata, Discover the source in grid, Optimizatio, Computational Grids

INTRODUCTION

Grid by according to collectivized the sources in a figurative organization is a solution for problem in active environment [1]. The aim of collectivizing is direct access to computer, software and another sources by complete control of source's holder companies and people who commonality this sources are composed the figurative organization [1].

Grid systems are divided to three classes: Data Grid, Service Grid and Computational Grids.

Data Grids: Information grids saved the data and then accommodated this data to users without user's awareness of location of this information.

Service Grids: The systems that presented in a grid, provide the services in which they don't presented by a machine. Service grids are divided to three groups.

Computational Grids: These grids should be used of cars that have high power against data grids in which the connected instruments in them don't need to high power, because the computational grids needs to high power of processors. The computational grid is a software and hardware substructure in which it provided the access to abilities, high level of computation as confident, compatible, extensive and cheap [2]. Thus one grid is connects to set of heterogeneous sources include of personal computers, work stations, clusters and super computers in which every source have different configuration and computational ability and they organized by different management's politics [3,4,8].

OVER VIEW ON GRID SYSTEMS:

Computational grid is software and hardware in which proposition the using of computation instruments to applicants. As low costs, confidence and compatible [5]. Computation grids has their abilities in which could create the figurative (VE) and by use of this agencies the communion and integrity millions sources are done this source in companies and organizations and management's area are diffused and they are composed of heterogeneous sources, management system and operational programs seine, engineer, business [1,6].

Utility in grid:

The sources of grid are registered in one or multi grid information device (GIS). Users are his/her needs to grid resource brokers. Then the source has been discovering by information service. The user's program for performance in this sources has been scheduled and its operation steps is control and supervised until end of performance. The completed scenarios have more needs, thus the environment of grid environment are include of security, discover the information, allocation the sources, advance the operations, management the operation, the compression of sources and schedule. The software tools and service providers in which creates the connects between data's sources to doing the process are known as grid mid ware. Figure (1) show the operation flow in grid as obviously [5, 7, 9].

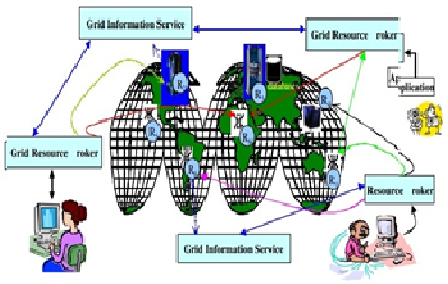

Fig. (1). show the current in the grid [7].

LEARNING AUTOMATA

Machine learning automata are finite in which it could be done finite actions. Every selected has been measurement by stochastic environment and give a reply to another learning automata. Learning automata use from this reply and select it's action for next step. In during this process, learning automata learned that how selected the best acts among own allowable acts. Figure 2 show the relationship between learning automata and environment [10, 11].

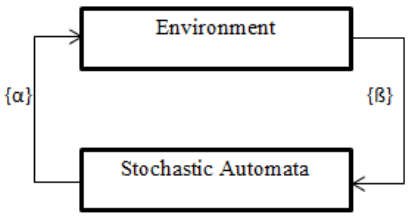

Fig (2): Show the relationship between automata and environment.

The relationship of stochastic automata and environment is show in

Error! Reference source not found we call this set by according to learning algorithm as "Stochastic Learning Automata" By this arrangement, we can show the Stochastic Learning Automata as quadruple $LA \equiv \{\propto, \beta, P, T\}$ in which r , is the number of automata's acts, $\propto \equiv \{\propto_1, \propto_2, \dots, \propto_r\}$, the number of automata's acts, $\propto \equiv \{\propto_1, \propto_2, \dots, \propto_r\}$ the number of automata's acts, $\beta \equiv \{\beta_1, \beta_2, \dots, \beta_r\}$ is the set of inters of automata, $P \equiv \{P_1, P_2, \dots, P_r\}$ is the possibility vector of automata's acts and $T = p(n+1) = T[\propto (n), \beta\beta(n), P(n)]$ In the learning algorithm.

A learning algorithm could be expression as:

$$P(n+1) = T[P(n), \alpha(n), \beta(n)] \quad (1)$$

If the operation of T be linear then the learning algorithm is as linear and otherwise the operation can be un linear.

If the learning automata in repeat N , is select the action of $\propto_i$ and receive the appropriate reply from environment, the main algorithm has been operated. At this time the probability of (n) Pi is increase and probabilities relate to another actions be decreased.

If the un favorite reply has been received the (n) Pi has been reduce and probabilities relate another actions has been increased thus we have:

For appropriate reply:

$$P_i(n+1) = P_i(n) + \sum_{\substack{j=1 \\ j=i}}^{r} f_i\left[P_j(n)\right] \quad (2)$$

$$P_i(n+1) = P_i(n) - f_i\left[P_j(n)\right]; \forall_j; j \neq i \quad (3)$$

For inappropriate reply:

$$P_j(n+1) = P_j(n) - g_j[P_j(n)]; \forall_j; j \neq i \quad (4)$$

$$P_i(n+1) = P_i(n) + \sum_{\substack{j=1 \\ j=i}}^{r} g_i[P_j(n)] \quad (5)$$

The functions of g_i and f_i are un negative functions and they are known as reward and fine function [10, 11].

4. SUGGESTED METHOD FOR SEARCHING THE BEST SERVERS:

We know that, using of optima zing algorithms in active environments such as gird don't have necessary officially and the use of learning algorithm by high computations in fix and steady environments didn't provided the best situation successively. Thus, we divided the grid's environment to two separately layers without confine ourselves to structure's environments. Of course, next these layers are broken and we created the inner layer.

In our proposed algorithm, we definition two abstract levels for discover the source and we presented one different algorithm for every level.

4.1. Algorithm for usual nodes (first layer): The In usual nodes, we exposure a intellectual method on base of enforcement learning that could be referred to more appropriate unite by help of learning in which done by pass the time in this intellect factor. Every node in itself has one table of search the way, in which this table has on line for every neighbor and two line for every kind of source in which one of them use for neighbor which access to source and another use for value of sauces. Nodes are used of this table for access to appropriate source. In fact, the general picture of these tables is as bellow:

Table (1): sample of value table

...	THE VALUE OF MEMORY	RAM	THE VALUE OF CPU	CPU	
...	5	1	0	0	FIRST NEIGHBOR
...	2	1	4	1	THE SECOND NEIGHBOR
...	...	...	...	...	...

If one call in relation to one neighbor and one source has been zero rate, this means that, this means that, it couldn't access to source through this neighbor and conversely if the rate of one saved in this cell, it means that it could be access to source through this neighbor. In according to number in which saved for every value in source its means of power of source.

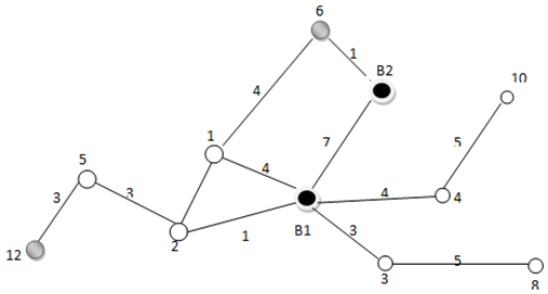

Figure (3): part of grid system

In this example, B_s are intermediate and nodes in system are determinate by number.

Supposed that the request of B_1 has been received and this requested source is in nodes 6 and 12 (grey circles), by this suppose, may be don't find a line related to this request B_1 should be search the system for find a source by according to distances and currents. We can observe that by pass of middle unit in current [B1-1-6] by distance 4+1+4=9 achieved to one of exist sources. The distance of this source from intermediate is 9 unit after finding these sources, all nodes in searching's way are represented the search way tables. In fact, all nodes in which could reply to request of A hadn't a good ability and may be a rapid node (better of other nodes) reply to the same request. For this reason every node should be account. In according to account the node's value, we use from this formula if t, is equal to time that one package of requested node spend to arrive to one source owns node (include of time of transmit ion in current and spend time for searching in nodes) and if b, is equality to emission package's volume of requested node to source owns node and if $\propto$ is suppose as constant in which it use for balance the formula and it could be having the rate 1 until it account as inert element so, if P, is the officially of received source, then,…

$$\text{The value of each source} = \alpha * {}^{b}/_{t} * p \quad (6)$$

Thus, all values have been accounted and they protect in this value table and the appropriate source in these usual nodes is found.

4.2. Leap by conclusion of genetics algorithm:

If one source has, been available to one of the intermediate neighbor's units, then this intermediate don't go to another units for request of this source. While it may be there is another sources in away distance by better officially, in fact don't use of this source.

Thus, in according to solution this problem in every step of programs operation, the time in which new request achieved to intermediate, act probability 0.2 intermediate randomly without looking to own table.

4.3. Algorithm for intermediates:

We divided the layers of intermediates to tow levels. First level is include of intermediates that related to usual nodes directly. And

second level is include of intermediates that are in father model for first level's intermediates and their function is carry the request by use of genetic algorithm to currents in which the first intermediates doesn't relate to them .As the main algorithm in this layers is in the first level and it found the appropriate intermediate by use of learning automata in which the mentions source exist in local nodes. The related relations for achieved to probabilities: (find and reward), if in repeat n the action of $\propto_i$ has been selected, thus we have (n+1) in repeat:

Receive the appropriate reply of environment [10]:

$$p_i(n+1) = p_i(n) + a[1 - p_i(n)] \quad (7)$$

$$p\,j\,(n+1) = (1-a)\,p\,j\,(n); \forall j; j \neq i \quad (8)$$

Received inappropriate reply of environment [10]:

$$pi\,(n+1) = (1-b)\,pi\,(n) \quad (9)$$

$$P_j(n+1) = \frac{b}{r-1} + (1-b)p_j(n); \forall j; j \neq i \quad (10)$$

The sources in which didn't found in this method, don't have the same power in addition they don't have the same distance to requested node, By according to it, we couldn't observed all of them likely, and we couldn't fine or reward all of them similarly. In according to this aim, we use of valuable system for sources, until we could create one coefficient for every source, in which this coefficient is the learning automata reward's coefficient. We suppose that t, is the time in which spend to achieve the package of requested node to source own node (include of transmission time in current and spend time to searching the way in nods) and, is the volume of emission package of requested node to source own node and β is constant coefficient in which it use for balanced the formula and it's rate should be between 0 – 0.5 so, if P supposed as efficacy of founded source , then….

$$\text{Reward ratio automata} = \beta * {}^{b}/_{t} + (0.5 - \beta) * p \quad (11)$$

Every intermediate supervised many another intermediates and they have the role of their father, in one tree relation this nodes have more broad information than intermediates and they have more scope of nodes in own table.

In according to genetic algorithm and prevention of limitations in local optimization, we pay attention to one parameter in which every request that send to every intermediate, by probability of $\propto$, send it for it's father in which it is a node by more ability. And charged the role of searching's current and it use from usual method by probability $(1-\propto)$ for searching the current when a request reach to father node, finding the more appropriate source has been high because of the father table is more vast . On

the other hand, the distance of access to sources by more steps to request place has been much reduced and it's limited to two steps. One of intermediate to father of intermediate and another from father to appropriate source of own node.

As we know, we use from learning automata and the probability of send to father is action of set of action of learning automata and its fine or reward such as another actions. For clear the matter, we refer preceding example.

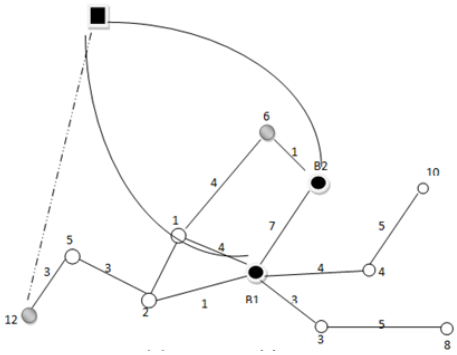

Figure (4): Part of grid system, how the intermediates of father performance

In above figure, the black square, we put the intermediates father B1, B2, Now if the exist request in B1 has been sent to father's node instead of usual method, this node give the request to node 12 directly and instead pass from multi intermediate node, it's found only by to movement of mention's source and this is cause to increase our rapidity in finding the appropriate source.

SIMULATION AND CONCLUSION

As mentioned before, we have been used from omnet ++4.2.2 software for simulation the proposed algorithm. Simulation has been done in stochastic environment in which at first, there isn't any cognition of environment and by pass the time and learning the package are directed slowly. The simulation's environment is so that in operation, some of nodes are earn the sources and algorithm tries to finding the appropriate source for every node. One of the factors in which it has more importance in discover the source, is the rate of error in discover the source. The rate of error is include of requests in which they emission for discover the source, but it doesn't direct in current correctly for every reason and it doesn't any correct answer to us. In below, we comparison the rates of errors in proposed algorithm in different situations. This comparison is on base of the rate of fine and reward's coefficient of learning automata.

As we observation in figure 5, the best situation is accuracy when the reward coefficient of learning automata is 0.1 and so, the fine coefficient of learning automata is equal to 0.1. In this situation, we will have lowest rate of error,

One of the aspects in which it has more importance in discover the source is the number of observed links in during the requests. Of course what the number of link is lower, then we have more effective

algorithm. In below, the number of observed link is represented in during 300 different operations by different nodes. This is cause to better comparison of algorithms [12, 13].

In according to figure (6), the proposed algorithm in all steps has better reply of other algorithms. In addition, the grade of proposed algorithm was more soft and its show low reaction against increase the number of nodes than other algorithms. One of the proposed discussion in discover the source is the proportion of observed links in according to discover the source and observed links numbers. The chart of figure (7) show the divide of links number in according to updated the presented link's number for discover the source in which it comparison the proposed algorithm to MMO algorithm.

By according to figure (7), we can show that proportion of presented links in according to updated against presented links in according to discover the source in proposed algorithm give us a better reply and it has good reinforce against increase the number of nodes.Now, we comparison the proposed algorithm by other algorithms in according to accuracy of founded sources.

Accuracy is means of proportion of emission of requested similitude to founded source the measurement criterion is present in [14]. Simulation is considered the 300 different requests.

By according to figure (8), we can observe that proposed algorithm give us a appropriate answer than other algorithm although in this area, the MMO algorithm provide a better answer than our algorithm, but the produced answer by our algorithm is acceptable.

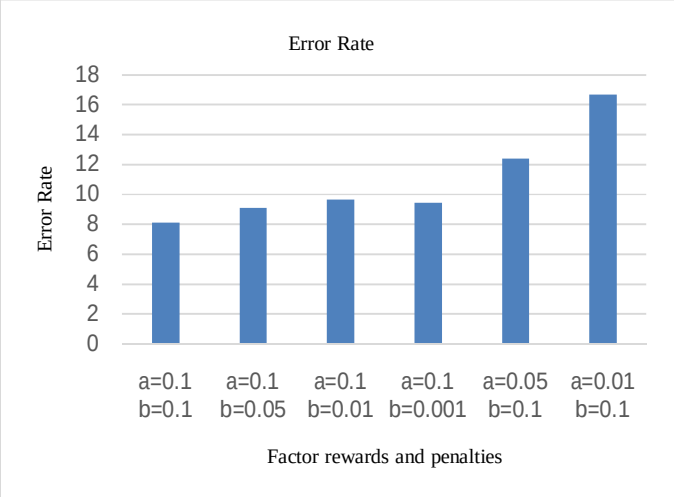

Figure (5): The comparison of error rate of proposed algorithm in different situations.

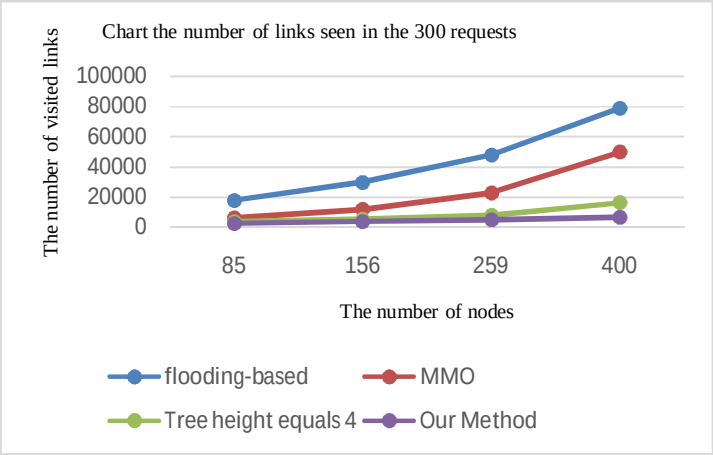

Figure (6): the comparison of algorithm in according to number of observed link in 300 request, number of nodes and number of observed links

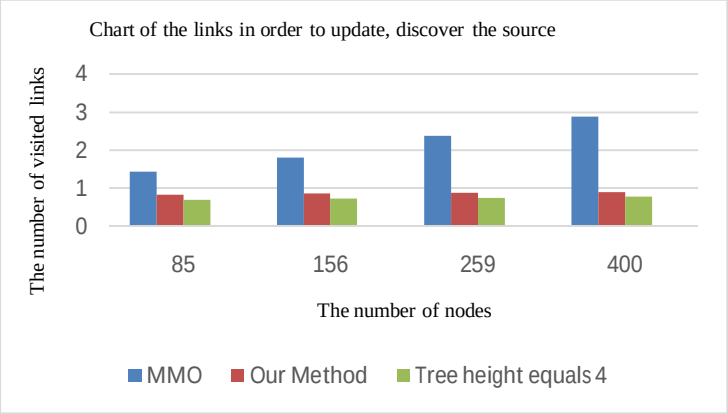

Figure (7): The comparison of proportion of presented link's number in according to updated and discover the source for three proposed and MMO and tree by height 4 algorithm

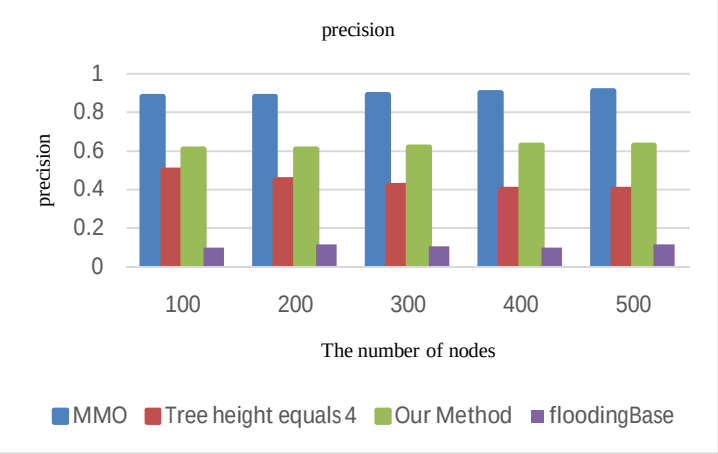

Figure (8): the comparison of accuracy of proposed algorithm to other algorithms

CONCLUSION

Grid is a vast environment in which it has different kind of sources. These sources may be more diffuse of geographically in this environment; one user may be need to one source of this environment for solution the problem. It is clear that, finding the source for users in such environment is difficult and complicated.

The mechanisms of discover the source in grid have this function. Every mechanism in which could found the source of requested user by create the lowest traffic, is more effective. In this study, we use of learning automata algorithm for searching the best server or best source. The conclusion of simulation show that represented algorithm than previous method has more favorite performance proposed algorithm has more ability of compatible to changes in environment and it's try to found the appropriate source by learning of environment's changes.

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