

Intellect grid network for management of driving accidents

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Abstract: one of the basic problems in accidents of Iran's roads is lack of alone reference for driving accidents management, this made clear the association between responsible organizations. One of the main problems in road accidents is lack of required sources (derrick, ambulance, helicopter, equipped hospital). It's better to use resource management for solving this problem, and intellect recovery of resources at road grid was suggested in present study. grid accounts is a computing model that were networked using computing power of several assist centers, and accounting them as an center structure of alone virtual assist can do huge operations on them. To this end we apply grid model. In other word grid can do huge operations by using computing power of several separated assist center which are related to each other's by grid (road). From the main properties of this grid we can address the lack of requirement to an equipped assist unit to control operations at all times. Regarding to probable changes on road's grid at emergency situations need to an intellect grid is necessary. So it required to present an adopted way with these variations. In a grid various units with different duties are working. One of these units is control center that its main tasks are requests and allocation of the best resource to new request. This intellect way was made based on reinforcement learning method that it can adopt itself with grid variations and it delivers best resources to damaged persons at appropriate time.

Key words: *Grid computations; Driving accidents; Control systems; Reinforcement learning; Data grid; Timing operations*

1. Introduction

Grid computations enable virtual organization to share distributed resources in aspect of geography to achieve the same goals. This would be implemented by lack of a central control and place and a trustworthy relationship. For solving grid's problem, it's necessary that best resources (derrick, ambulance, helicopter, equipped hospital) found as fast as possible and applied them for implementation a part of the problem. Mentioned ways for accident management has tried to do the requests at least time .but, any one aren't such that adopt themselves with grid changes and to be flexible against these variations.

whatever we consider here is placement of an intellect grid into some units from grid that have activated as control center(mediator) and they can consider grid and exiting resources during the times that the grid is used and also make the least time for responding. Actually can be said that we convert any mediator to an intellect agent 3 which has ability to learn and to complete its familiarity with grid and its nodes. The main way which used to make a mediator intellect is reinforcement learning (RL).The reason of selecting this method for grid was many correspondences which were observed in structure of reinforcement learning method and grid. its noticeable that the reinforcement learning method

has a online like learning, it can be used for those environment that are visible and applicable partly and unlike other learning methods(like genetic method or nervous grid)they don't require large amount of true trainer data, but also in this method general procedure is such that according to the achieved reward at the end of road to covered steps in that way we get consideration or we get a reward idiomatically .with altering this method we will consider all nodes and units in real values and in fact we get complete consideration.

1.1. Presentation of resources management in the grid

To accomplishment of a new request in grid, the request to be sends to mediator unit I the grid. This unit had identified required resources for mentioned works and had selected best resources and work sent to them.

1.1.1. (BFS)

This method can be known as the simplest and the most applicable inquiry method. The producer is so simple: each node which has a request , has send that request to all it's neighbors and then search in the its local data for finding the response and this act has repeated for each node that received the request. If the required resources have been found the message will be returned and the sender mediator of

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this request also ask resources from the nearest node which responded to its request. The problem of this method raise the traffic of the grid .Suppose we have node n at a theoretical state that each one is neighbor of node m. At first step the mediator sends a request to node m ,each one sends a message to another node and after passing another steps a large number of requests have been sent that made the grid busy. To remove this weakness point life time ttl determined for each request. And it determines maximum inquiries of request. This parameter reduces along any inquiry step and if it became equal to zero there is no node for sending. In similar grids also this method has used. Often in that grids ttl determined as 5 Or 7.these parameters and their values are varied and value of ttl for any work has determined according to level of significancy and other parameters that asked as work presentation.

1.1.2. (RBFS)

This method acts like pervious method and but at any step exiting request has not sent to all its neighbors but also it sends request to some of neighbors. This method also has some advantages and disadvantageous. Reducing traffic of grid and acceleration of inquiry are from its advantages since nodes have not any former information and no time is spent for exploration and decision making in this case. Each node has selected numbers of neighbors and sends the request to them.

The main disadvantageous of this method has made because of stochastic nature of selection of neighbors since those parts of grid which are fare from and are placed in grid by a few units and nearly aren't searched never and their resources has not used while it made available our requested resources .In other words, lack of knowledge and stochastic sending will not be the best method and by having and conserve of neighbor's informations the inquiry utility can improve.

1.1.3. Inquiry by using stochastic steps

This method tries to improve previous ways. In this method instead of starting from a mediator, it starts from n mediator and each one of them searches needed resources from beginning. Disadvantageous of these methods are the same as weakness point of rbfs and optimized results are not achieved because of being stochastic, and because of searching from some ways (linear addition of number of neighbors from one node to another) it has better utility.

1.2. Explanation of intellectual inquiry method

we present an intellectual method to find necessary sources in mediator unit grid based on reinforcement learning until by assistance of that learning has been made in this intellect agent by passing time ,referring to more appropriate and

available units to be possible, and to do assigned functions with better utility at the least time. The applied idea is based on this fact that each mediator in grid has accounted as an intellect agent.it can be said that there is the same intellect agents as number of mediator units in units of a grid that all of them have learning in parallel and synchronously and these units get more complete consideration of environment by using this grid and passing time.

These agents at the beginning have limit information of their neighbors and have no consideration of their utilities and other exiting resources.by passing time and while it's responding to requests learning was started. The mediators give value to these units according to types of requests and the way that responds to them.so that at first any mediator has some informations about $1/n$ properties of source units(n is the general number of resource units in grid which is at the beginning of grid's usage)also each mediator has some information about this subject includes types of existing resources in each unit it has no information from the utility value of units(for example it's possible that any two units inform that they have source A, but one of these two be available in the grid along time ,so it act better and respond to request of source A quickly. at beginning the mediators don't have enough information about the application of units), so the value of all nodes are the same its noticeable when we say meditators have information from the resource actually mediator has related whit two other units, information center and catalog and they requested these informations and in fact these informations where stored in that units not mediators. here because combination of these three types of unit together have made no problem and has no effect on over method these three models of unit (information center, catalogs, and mediators) accounted as a mediator unit.

By passing time this value has changed the given value to each unit has relationship whit speed of responding of that unit to request and value of reliability and appropriateness of response. Perhaps at first this evaluation seems illogical since at the beginning (for example after responding to two requests) the value of two units which responded to request changes a lot and value of other units remain without change but by passing time and responding to more numbers of request and applying required variations at values these values tends to real values and their main value. Actually we can say that mediators have found consideration of grid and had learning. any mediator regard to value that grid nodes have for them to send their functions to them and always has kept the best information about resources till use it in later request.

If we have an environment without change in grid this learning to come to end and we could account time of ending as complete recognition of mediators. This event doesn't happen in grid (this is the main property of grid that causes many of methods haven't good function).the grid is a dynamic network in which exciting units can be available at different

time or have been egressed so table of values of many mediators will be changing along usage time. for example may a unit has a beneficial performance and be near the mediator, thus this mediator will be valuable for that unit .If this unit exited from the grid for a short time, the estimated value for that will be reduced gradually and if this procedure to continues and that unit be exited for a long time ,unit's value will be reduced a lot and may it takes out from the table of valuable units for mediator and Its clear that inversion situation also takes place.as the grid has dynamic changes ,information and units value changes and we can practice changes on line and have learning .

2. Explanation of presented idea at an example form

In this section we explain recovery resources and determine values for unit and also we indicate how making value can help us to select ways. Following image indicate a part of grid:

2.1. Sample of grid network

At this example 1B is a mediator and nodes of grid were determined by numbers. The mediator 1B hold distances of node at the beginning, but it has no information of doing works. Suppose request r receives by 1B and this requesting source existed in nodes 6 and 12(gray circles), but ability of these two units for doing request aren't the same. Unit 12 with ability equals 0.8 can respond request and unit 6 is able to do the same function with power 0,2(for example unit 12 ,a powerful system with high speed processing while system in unit 6 is a common system with weak ability .now ,mediator 1B search the grid according to paths and distances to find resource. nodes 1,2,3,4 are the first nodes that this mediator will get to and they placed at distances such 4,3,1,4 from the mediator . we didn't get the exited resources. those nodes which were seen by holding the paths for each path are as the following: we reach from node 1 to nodes 6,14,7 by continuing the way and in this way we get nodes 5,9,13 by following path 2 and this procedure will be followed.

So far the covered distance has been for getting 5,5. paths 5,2,1B were perambulated to get this node and we passed from unit 2 which equals to one unit(for distinguishing between the nodes with 4 units distance ,for each node between the path ,one unit is added to length of the way. the existence of these nodes make the found path depends on themselves),so length of the way for getting the node 5 is equals to:1+1+3=5,we can see that WE GET ONE OF THE RESOURCES by passing from one middle unit in the way (6.1.1B) with distance equals to 4+1+4=9.As can be observed the distance between this resource and mediator equals 9,so, we claims that we found a resource and have accounted its distances. Thus, from here the only sources are significance which were placed in distances lower than 9 .as mentioned above along all path we

followed the paths that their distances are lower than 9, for example we don't follow a path such (10.4.1B), because the distance equals 10 till now and no resource was found in that way so a better will not found in the way. the paths followed with short distances and we reach to another path(12,5,2,1B) and distance of this source achieved 1+1+3+1+3=9.when paths with the same distance are found, a function assigned for them and value of each node was accounted. For computing value of each node we use this formula:

Value of each node=utility of found resource

For example, utility of exited resource is at 12, 0, 8 .so the value of unit 2 equals: (1-9) =6, 4, 0, 8. in this way all values has computed and will be kept at value table (each mediator has a table to keep information of grid and also their values) regard to these values in latter requests, for computing path we subtracted node's value from distance and we tend to optimized path .If one unit be required and absence of it at aimed moment, its value will be reduced. So, if a unit has not been in grid for a long time its value will be reduced .the other significant point is the relationship of mediators with each others. In the same example if mediator 1B has a connection with 2B and ask it the request, it gets the source by 1+7=8 distance (mediators don't exit grid never, so there is no need to increase the amount of distance because of passing from mediator) as mentioned above the relationship between mediators can be effective on process of recovering of data.

2.2. Utilization, learning and setting of the grid

Since has explained the way of qualifying we can start learning process. Before following the matter, expressing this subject is necessary that all nodes cannot respond to all our requests and for this reason the ability of each node has determined before beginning to use grid. Also all nodes that can respond to request A haven't the same capability and may respond to a node with higher speed and better than others (capability of grid's system is different, one of the nodes can be limited assist station and another one be a assist station with higher capability).for determining capability of any system a number between 0 to 1 attributed to any node that indicates the capability of that unit for responding to that requests. These resources also can be available at various time and or be setting another request or exited from the grid completely .so .nodes have various capabilities and also node itself can exited from the grid. This data also placed in 2-dimensions arrangement and on the line related to node. to determine the node is available or not we will have a Boolean variance for each node that 0 value of it means no availability and 1 shows availability .these values will change during the program for nodes .At first number of nodes and selected mediators randomly in this experiment reported to user and then our selected way to searching resources has been asked. By selecting RLS method (our proposed

method) explained operation has followed .if other options were selected one of proposed ways implemented at stimulated condition.

In following sections of paper we explain operation of intellect way to recover the resources:

beginning of any program we placed utility of mediator at a thread until follow their function in parallel and each of them are activating independently and has learning (like use of them in a real grid).any mediator has a table in which stored primary data of its neighbor nodes .Mediators in the beginning know all actions of their neighbor nodes and also they know distance between the node and itself. Mediator function to be started by receives of new function.

mediator tries to recognize aimed resource and holds it for user.to this end mediator pays attention to its table and if it find an unit which includes requested resource, apply it .regards to way of node respond to its utility request for grid (this request recognized at its practice time).If the mediator hasn't aimed resource in their units or don't receive respond, its necessary that chasing the node and finds the resource. So, it starts to search and tries to find the simplest and closest node .any time that found aimed resource sends the request to it and according to node's utility and distance, new evaluation made. This procedure is the main part of inquiry that some solution proposed for modifying its utility to prevent complexity of the problem, firstly we describe those cases which used to utilize intellect grid and added to whole algorithm and finally we express general algorithm.

3. Mediators association with each other's

Along the mediator's inquiry to find resources among nodes, it also asks required resource from neighbor mediators. If that mediators have information about this source the mediator can by accounting its distance to mediator to exploit other information and its possible that find better resources by assistance of them. Therefor inquiry function continues in two ways, independent way and by assist of other mediators and those methods that takes less time to conclude is used.

4. Random act

The presented method has some problem initially that reduced speed of learning .the reason was such that if neighbor unit has a source at the beginning of function ,the mediator doesn't chase this resource for request while existence of more beneficial resources was possible and actually is not used.so, for solving this problem at each time of implementing the plane ,when a new request reach to mediator ,with probability 0.2 ,the mediator acts random and without observing it's table. Although in this way may spent more time, but process of finding other sources and their capability made at higher speed. The value 0,2 achieved during made tests.by using this method and changing this

coefficient that it was seen that the final result gives the best result. Idea of this function was given from genetic learning method .in genetic learning way two main actions are accomplished: mutation and cross-over.

Cross -over is combination of gens from a generation to another that child gen made from mixture of parent gens .And mutation is the genetic mutation which occurred from one generation to other. Perhaps, by this mutation, we can achieve properties that we have not achieved so far and finally we access to optimized values.

5. Inquiry accomplishment from multiple paths

Iteration of tests shown some states in which values of two ways are similar or very approximate to each other.at primary state always best method was selected and accomplished(of course after implementing mediator's argument ,it can be said that with any time of mediator's arguments and independent inquiry the best method was selected)however with other general implementation utility of system improved ,this generality was so that after finding the best units request was sent to three valuable units at any time of request. Doing this has some advantageous and dis advantageous, Here we describe it: some of advantageous of this method was accelerating of reception .we know that in grid network we cannot assure that a unit in grid is available for us. So it's possible that a request sent but no respond was receipted. When this request sent to 3 units we receipt its result probably and totally the speed of function will increase. in other word there is another strength point is up to dating of 3 value at any iteration and totally mediator data will be more precise .the main problem of this method is addition of grid's load and occupying more number of units for a function. This method adds traffic of the grid if resources of the grid be limited with many requests so functions arrange at intervals, thus general utility of system will be reduced. In general applying this property depends on grid's structure and future works can investigate this area.

6. Applied algorithm in intellect method

Algorithm can be defined in brief as following:

-when a request reaches to mediator:

Each mediator acts as probability 0, 2 randomly and 0, 8 depends on its available data.

When act isn't stochastic

-mediator concerned it's table of value and select the best nodes and send function to them and depends on its operation unit's value changes(max, min)

-when it is at primary times and table of value has no amount yet ,the function send to an unit which have that resource or we search unit which have aimed resource.

-the mediator ask its request from other mediators and depend on their tables can use other

found resources (of course by accounting its distance from mediator)

-the mediator can to accelerate send function to several units synchronously so values of all ways changed.

-depends on type of unit and value of its utility table of values to be up dated

-if the units which have resources to be found ,function refers to it and table of values to be up dated.

This function accomplished frequently and values of nodes achieve its optimized value.

7. Evaluation and test's result

For implementation of test and comparison of exited methods its necessary that other methods applied in similar condition .so (models FBS, RFBS) and a method which had a method in memory to keep operation KLR and was not any evaluation there. Primary structure of all methods is the same and the only main difference was applied search at any times of test.it has not very good utility and the simple method BFS has better utility; firstly we applied these methods at small scale. As observes our intellect method has RLS and the reason as mentioned before is the small size of the grid and in this situation the worst type of inquiry also doesn't take long time .notice: horizontal axle at whole diagram is numbers of applied requests (number of irritation of test) and cross axle is spent time for search. Achieved times in all test converted to ratio (0-10) .In next step we do this test for large scale and utility of presented method was observed and its visible that utility of methods BFS and RBFS has no variation during time. Method KLR would be better by irritation of tests. But presented intellect method has better utility .point: its noticeable that utility of this method at primary steps is not very beneficial and process of learning follows slowly.

At third step to remove the slowness of learning, some variations have been made. Implementing a section of function was stochastic and inquiry in some mediators was added to applied method and function results were observed .as it seems by applying these cases utility of system improved and can be said that the procedure of learning is more beneficial (cases act as catalyzer for learning).

At fourth step, 3 ways applied for any request that improve the utility but its noticeable that this action doesn't help grid's utility and in spite of large number of requests implementing this function makes practice useless amount of actions on the system.

8. Conclusion and future suggested works

Transportation intellect systems are one of the achievements of information and communication technology in transportation. And it has significant influence on all cases and cultural, political and economic fields in the country .transportation and movement of goods have concerned as one of the

most important human needs in huge planning of the country. Today's information technology for solving problems of transportation has concerned by experts. As mentioned in this study and proposal of various methods to inquiry resources in the grid, this method can be concerned in allocation to necessary resources and at emergency situations to assist damaged persons. These resources include derrick, ambulance, helicopter, experts, fire company, police and etc.

There are several agents that lead to use of the grid network:

- 1, speed of availability
2. Intellectuality of resource identification
3. required exploitation to apply resources
4. Justly division of resources all over the exchanging axils

At recent years Iran was faced with this problem, lack of association in related organisms .regards to intellectuality of this method and low costs, this method can assist this. And assist related responsible persons. Automatic following and GPS systems lead to actions with higher utility and finally ITS systems result in reduction in transportation costs, avoidance of decimation and also increase of security in transportation.

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