Ant network in In-Line dot Routing

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ABSTRACT

In network the quality of service owing to the inability to reach to the server quickly. So there is a need from an optimum method which provides easy access to the server. This paper presents Ant network in In-Line dot Routing. We bring out the Ant colony Optimization (ACO), a behavior under Ant network in In-Line dot Routing which is used to find the shortest path and the correct path of the server and also provides solutions for getting response without reaching the server and data delivery.

***Keywords* –**Ant Network in In-Line dot Routing (ANILR), Ant Colony Optimization (ACO), Roaming Agent Informers (RAI), Path Detectors (PD) Better Optimization Routing Process (BORP).

1. INTRODUCTION

Ant Network in In-Line dot Routing systems are typically made up of population of Roaming agent Informers and Path Detectors they are simply interacting locally with one another and with their environment . This inspiration often comes from nature, especially biological systems. This Roaming agent Informers and Path Detectors follow very simple rules and although there is no centralized control structure dictating how individual agents should behave locally and to a certain degree, random interactions between such agents lead to the “Informers “ global behavior , unknown to the individual agents . Natural example for this is ant colonies, bird flocking and bee colony. Ant Network in In-Line dot Routing is used in the context of forecasting problems. Ant Colony Optimization process among the Ant network in In-Line dot Routing system for the quick delivery of data and finding the shortest and correct path to reach the server. Ant Colony Optimization (ACO) relies on the behavior of real ant find the server. Here we use the behavior of ants which finds the shortest path through Pheromonic Acid (Finding the Server by Shortest Path), Roaming Agent Informer which find the nearest food source after finding the shortest path (Getting Response without Reaching the Server) and Path detector will collect the food source (Data Delivery).

2. COMPARISON OF ANT NETWORKS WITH OTHER NETWORKS

2.1. Bees network

In Bee network the bees finds the food source based on the movement of sun, location of nest and flower. Initially the forager bee chooses the food source by finding the angle between the nest, sun and flower. Then it will convey the location of the flower to the scout bee through waggle dance. Scout bee is aware of waggle dance and these bees are responsible for the collection of honey. Forager bee’s role is to find the location of food source and schedule the work of the scout bee to collect the honey. This optimization needs a lot of scheduling process and predictions. As a result it will increase the burden in network, whereas in Ant colony, Scheduling and predictions are not necessary and in Ant Network in In-Line dot Routing they leave the acid that is released by the Routing Agent Informer and it is detected by the Path Detectors that should be shortest and quick and reliable path.

2.2 Birds network

Normally birds fly in “V” Shape. The V shaped formation that geese use when migrating, serves three important purposes:

1. It conserves their energy. Each bird flies slightly above the bird in front of it, resulting in the reduction of wind resistance. The birds in the front take turns, falling back when they get tired. In this way, the geese can fly for a long time before they can stop for rest.
2. It is easy to keep track of every bird in the group. Fighter pilots often use this formation for the same reason.
3. When the birds fly in “V” shape they will not follow a proper direction and also they will distribute the things by giving signals. In this there is conformation that the following path is correct path or not.
   This type of optimization process concentrates only on the efficient way to reach the server and does not worry about the data delivery.

2.3 Better Optimization Routing Process (Ant Network in In-Line dot Routing)

The above Bees network and Birds

network is suitable only to reach the server and is not much efficient for data delivery in correct path. Ant Network rectifies on the two problems mentioned above. Here, the real ant behavior is mapped to data service and efficient way to reach the server in correct and accurate path and delivery. ACO is implemented using simple prediction by referring to the maximum count in the router, to find the shortest path and to efficiently deliver data to the user.

3 Behavior of Real Ant and their Network

3.1 Normal Ant Network

Real Ants are capable of finding the shortest path from the food source to the nest without using visual cues. Also, they are capable of adapting to the changes in the environment, for example finding the new shortest path once is no longer feasible due to a new obstacle. Consider the following figure in which ants are moving in a straight line which connects the food source to the nest:

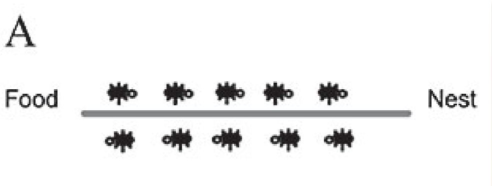

Fig: Normal Ant Network

3.2 Disturbed Ant Network

It is well known that the main means used by ants to form and maintain the line is a pheromone trail. Ant deposit a certain amount of pheromone acid while walking and mostly each ant prefers to follow the direction, which is rich in pheromone rather than a poorer one. This elementary behavior of real ants can be used to explain how they can find the shortest path which reconnects a broken line after the sudden appearance of an unexpected obstacle that has interrupted the initial path.

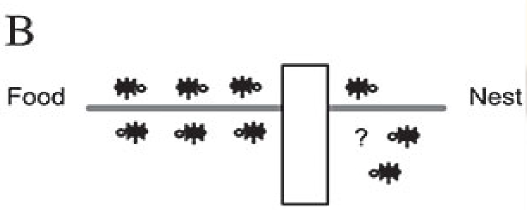

Fig: Disturbed Ant Network

3.3 Searching Path in Disturbed Ant Network

Once anything come in middle of the Ant Network the ants which are just in front of that thing cannot continue to follow the pheromone acid trail and therefore they have to chose between turning right or left. In this situation we a can expect half of the ants to choose to turn right and the other half to turn left. The very same situation can be found on the other side of the thing.

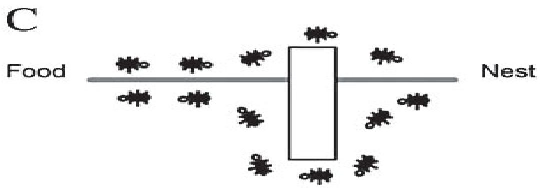

Fig: Finding alternate path

3.4 Shortest Path in Disturbed Ant Network

In this disturbed network ants are divided into two groups in that some will move to left and some will move to right of the thing. In that ants will check the more pheromone acid rather than light pheromone acid.

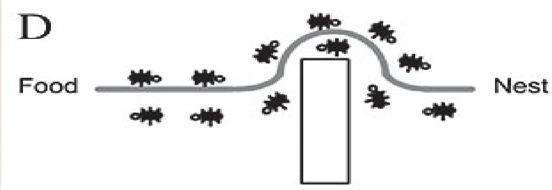

Fig: Finding shortest path

The most interesting aspect of this autocatalytic process is that finding the shortest path around the thing which is placed in ant's network it seems to be an emergent property of the interaction between the things shape and ants' distributed behavior. All the ants move at approximately the same speed and deposit a pheromone trail at approximately the same rate, it is a fact that it takes longer to contour thing on their longer side than on their shorter side which makes the pheromone trail accumulate quicker on the shorter side. It is the ant's preference for higher pheromone trail level which makes this accumulation still quicker on the shorter path.

The problem with the way in which ants find the shortest path naturally involves the addition of a new shortest path after the ants have converged to a longer path. Because as the pheromonic has been built on the older longer path the ants will not take the newer shortest path. This would be a major problem if the algorithm is applied to dynamic problems in computing. However a simple solution can be created. If the virtual pheromone evaporates then the longest path will eventually be abandoned for the shortest one by the roaming agent informer. This would be a major problem if the algorithm is applied to dynamic problems in computing. However a simple solution can be created. If the virtual pheromone evaporates then the longest path will eventually be abandoned for the shortest one by the roaming agent informer. This is because some ants will still take the shortest path by chance (periodically roaming) and so pheromone will build up and eventually overtake the longer one.

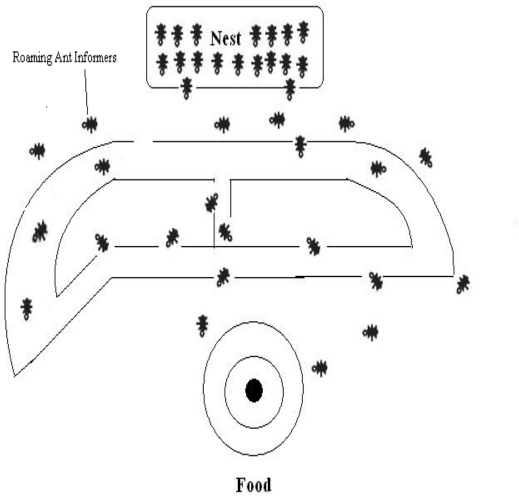

Fig: Roaming Ant Informers

All the informers will check the food location and the path detectors will check the strong pheromone path and remaining ants will follow the path detector to reach the destination food location

4. Ant Network for Enhancement of Data Service

In this ant network the time delay in response from client and server will be reduced by studying the real ant behavior, there things should be followed while processing and delivery data.

4.1 Shortest path to reach the sever (by following the thick pheromone acid)

Clients are connected to the server through a lot of nodes, thus the shortest path can be found out by selecting the path which has lesser number of nodes. This simple logic can be used by the artificial ant i.e., path detector to find the shortest path. The following diagram will explain how the artificial ant finds the shortest path. When the user is connected with the network, the ants will travel in different paths and reach the server. As described above, client is connected to the server through nodes like Router. On reaching each and every node, the ant updates the count value in the router if the ant travels through it. Roaming Ant Informer will find the food location and the Path Detector will find the shortest path by comparing the count value in router. While traveling through the router it will update the pheromone count in the router. If anything come in between ant network then should choose the nearest node i.e., each and every node is connected to the nearest node , this is suitable to reach the server by referring to the next maximum value in the pheromone count.

The client request and server response are transmitted through the path which is found out by the path detector.

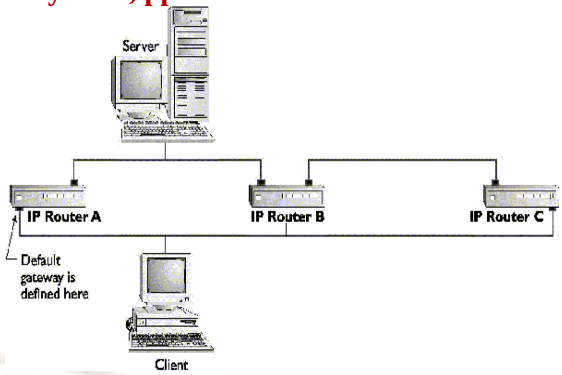

Fig: Shortest Path

4.2 Data delivery without reaching the server (Roaming Ant Informer will find the different different paths and Path detector will find shortest path)

The Roaming an informer will find the path from nest to food area, Path Detector will find the thick pheromone acid line and it will find out the shortest path form nest to food source. After finding the shortest path, there may be food source which available nearest to the nest (newer shortest path) compared to the path selected as shortest one (older shortest path). The ant colony is not efficient for the shortest path problem. So to avoid this ant follows one simple rule to find new shortest path. There may be roaming ant informer that they always roaming around the food source after finding the shortest path also that to find another shortest path it is used if anything come in between their network. Path detector will detect the thick pheromone acid line and it will guide the remaining ants to follow his direction. This is also done by the artificial ant by analyzing the request quest queue. When the requested data is available in the response queue then the roaming ant informer will find out path and the path detector will find out the shortest path then deliver the data. This will faster then delivery of data and reduce the data and reduce the burden of the server and also it will root the network in a right direction.

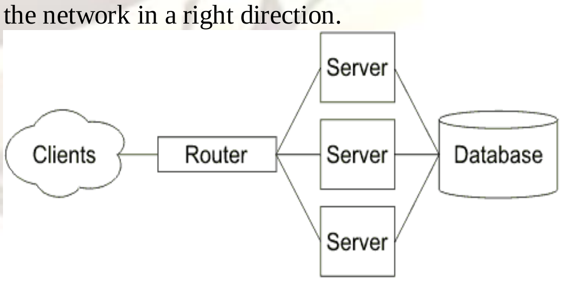

Fig: Data delivery

4.3 Data delivery (collecting the food and storing it in the nest)

This is a simple process for the ant to collect the food source and reach the nest. The ant follow the same path to reach the nest as it reaches the food source earlier. Thus the data delivery is easy if data source is easily available. Thus is made possible by artificial ant which is used to find the shortest path i.e., Path detector

5. Architecture

The following architecture describes the data processing and delivery from client to server by implementing the ant coolly optimization. The request sent by the client is tested first for incoming load smoothing where the irrelevant requests and exceptions are handled before reaching the server (Identifying the difference between the food and things/hurdles by the ant). Then the request is checked in the request queue. If it is available there then data is delivered from the response queue directly (Finding the newer food source which is nearer than the earlier one). If the data is not available are no longer in the queue then the request is passed to the server through the shortest path by comparing the pheromone count in the router (Finding the shortest path by Path Detector ant). The data is delivered to the client (food is stored in the nest)

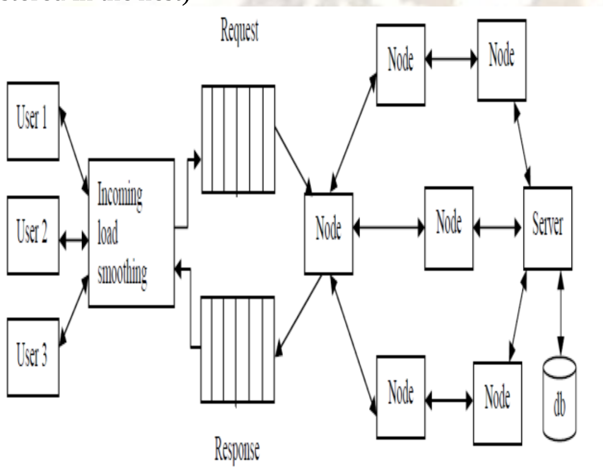

Fig: Architecture

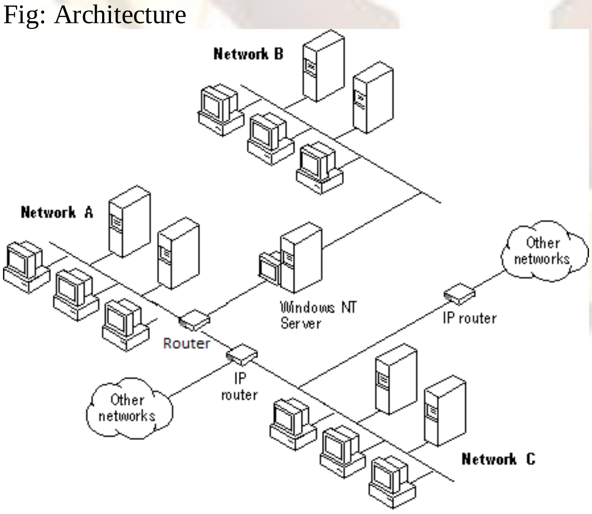

Fig: Routing

6. Conclusion

This paper describes how the Ant colony Optimization is suitable to reduce the service delay in data. Ant colony optimization network efficiently handles the shortest path and reduces the burden of the server by delivering the data directly if it is available in the response queue. So the optimization process will provide the better way to increase the data service. This process efficiency handles the obstacle in the path and will provide the data delivery. However in the future further enhancement of this approach can be implemented for more dynamic data in the server. In the future, his optimization process will be developed for highly dynamic data.

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