



Routing Algorithms in Networks

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Abstract

Network is defined as a group of two or more computer systems which are linked with each other. It allows computers to exchange data from each other along the data connections. Routing is a process of selecting path in a network along which the packets are sending over the network traffic. There are many routing algorithms which are used to determine the path, load, and distance over the network traffic. In this paper, a routing algorithm is taken as a tool for making an analysis over the research work done in network algorithms. Routing algorithms are classified as adoptive routing algorithms and non adoptive routing algorithms. An adoptive routing algorithm is an algorithm in which the network path can changes their routing ways *s* in accordance to the changes taken place in the network topology and in the traffic. It is having a dynamic routing table in which it sends data over the network. Distance vector routing algorithm, link state routing algorithm, distributed routing algorithms are comes under the category of adoptive routing algorithms. The non adoptive routing algorithms are the algorithms in which it follows a static routing table for the data to allow transmission over the network. This algorithm does not adjust with the current traffic and the network topology. Shortest path routing, flooding algorithms are comes under the category of non adoptive routing algorithms. In this paper, an analysis is made over the routing algorithms such as between the adoptive routing algorithms and the non adoptive routing algorithms. The results are favored to the adoptive routing algorithms in which the researchers can easily find the best routing path in a traffic over the network since it adjusts to network when compared with non adoptive routing algorithms. The researchers opt this because of the dynamic routing table. The results of the efficiency of the adoptive routing algorithms are better when compared to the non adoptive routing algorithms. The results concluded in this paper that the adoptive routing algorithms give best routing path when compared to the non adoptive routing algorithms in the networks.

Keywords: Adoptive routing algorithm, dijkstra algorithm, flooding, non adoptive algorithm, shortest path routing.

Introduction

The adoptive routing algorithm cans changes their routing path depends upon the search time and efficiency, query hits, efficiency, and messages. But the non adoptive routing algorithms which are otherwise called as the static routing algorithm cannot changes their routing path depends upon the topology of the network. The results showed that the adoptive routing algorithms gives better efficiency than in carrying out the search performance, cost, etc., when compared with the non adoptive routing algorithms. Flooding algorithm is one of the non adoptive routing algorithms, described in this paper about the flooding attacks by neighboring nodes to take for preventing these attacks.

The dynamic search algorithm is proposed for improving the search performance. Dynamic search algorithm is a combination of good qualities of flooding and random walk¹. In this paper, flooding algorithm is used for a short term search and the random walk algorithm is used as a long term search. Flooding algorithm which is a non adoptive algorithm is most probably used in Mobil ad hoc networks (MANET)². Since there is no centralized infrastructure in the mobile ad hoc networks, a new approach is introduced. That approach is based upon the friendship between the each and every node in the tree which in turns makes each

node to co-operate with each others. It also avoids flooding attacks between the nodes in the mobile ad hoc networks (MANET)³. An adoptive routing algorithm such that distance vector algorithm is used for implementing the performance results.

Among the distance vector algorithms, two routing protocols such that the ad hoc on demand distance vector (AODV) routing protocol and the destination sequenced distance vector (DSDV) routing protocol are specially designed for mobile ad hoc network (MANET)⁴. In this paper, a comparative analysis is made over between these protocols in terms of packet delivery ratio, throughput, and routing overhead by using NS-2 simulator⁵.

By selecting dijkstra's algorithm for finding the path problem and is implemented in quantum search⁶. The implementation results represented the dijkstra's algorithm as a probabilistic quantum – classical algorithm⁷.

Related Works

Many research papers have reviewed and analyzed the performance of the adoptive routing algorithms and the non adoptive routing algorithms. Most probably, the adoptive

routing algorithms give better efficiency in packet delivery ratio, throughput, routing overhead etc.

Nilesh P. Bobade performed their experiments for testing the ability of Ad hoc on demand distance vector (AODV) routing protocol, which reacts on network topology changes by using NS-2 simulator. In their NS-2 simulator, a network size of 50 nodes is taken. Then, the packet delivery fraction (PDF) average end to end delay, normalized routing load and throughput are calculated on the 50 nodes and their performance are taken as a result.

Teressa longjam et al.² compared the performance of the destination sequenced distance vector routing protocols (DSDV) and ad hoc on demand distance vector (AODV) routing protocol such as packet delivery ratio, throughput and routing overhead by using NS2 simulator³. The comparative results are analyzed by keeping the number of connections as constant. The results are also analyzed by varying the number of nodes.

Srikanth B 4 proposed dynamic search (DS) algorithm which it is analyzed on the basis of efficient performance such as the success rate, search time and efficiency, query hits and messages. The results shown that dynamic search algorithm gives performance better than flooding and random walk algorithm. Figure-1

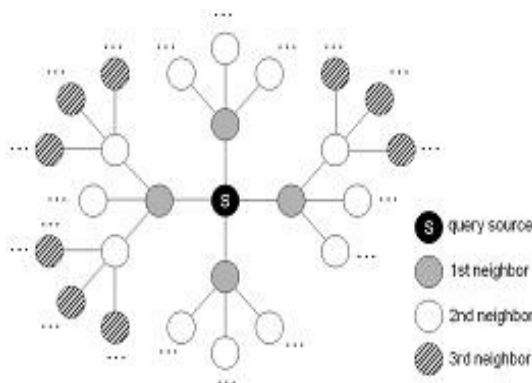


Figure-1
The operation of flooding and RW

Umarani .R⁵ studied a review about the distance vector routing. In this paper, link state and distance vector algorithm is taken as an important tool on estimating the MANET. When compared the link state and the distance vector algorithm, the results shown that the distance vector algorithm is having much impact on MANET⁶. When compared link state and distance vector algorithm, the results shown that the distance vector algorithm is having much impact than link state algorithm.

Revathy venkatraman reviewed in his paper about the prevention of flooding attack in the ad hoc networks. On implementing distance vector protocol in the ad hoc network,

the trust algorithm is test and the performance results are evaluated.

Taehwan cho et al.⁸ constructed a hybrid routing algorithm which is a combination of good qualities of both adoptive algorithms and the non adoptive algorithms is implemented for reducing the total execution time of the shortest path tree. In this paper, it is proved that the hybrid routing algorithm gives better performance in the execution time than the other shortest path algorithms in the networks. The execution time decreases in hybrid routing algorithm when compared with other shortest path algorithms.

Ali mamat et al.⁷ proved that the dijkstra's algorithm as a probabilistic quantum- classical algorithm. Probably, dijkstra's algorithm is used for implementing in the quantum search. But, in this paper, it is proved not only for implementing quantum search but also for the classical parts.

Algorithms

The algorithms which are used in this paper are as follows:

Dijkstra's algorithm: It is used most probable for finding the shortest path in the networks. It is a quantum search algorithm .

The algorithm is as follows:

Step 1: Initializing source vertex s , then it is incremented and it grows as tree T .

Step 2: Vertices are incremented to tree T , which is based upon the distance.

Step 3: Incrementing starts from s , then to the vertex closest to s , and then it is incremented to the next closest and so on.

Advantages: It is a quantum algorithm which is faster than others for completing the topology with dense graph. It is also used to find the shortest path for unknown graphs.

Disadvantages: The quantum search algorithm can be mixed with other classical algorithm and a new approach can be proposed but the problems are yet to be carried out.

Distance vector algorithm: It forwards the information to each and every node from and to its neighbors. The algorithm is as follows:

Step 1: Initializing a single source with G containing no negative cycles.

Step 2: If uses $d[u]$ as a upper bound such that distance $d[u, v]$ is calculated from u to v .

Step 3: Then, it is decremented as an estimate of $d[v]$ from the source vertex s to each vertex v until it reaches the actual shortest path.

Step 4: Boolean turns TRUE if the digraph contains no negative cycles otherwise it turns to FALSE.

Advantages: It finds shortest path faster when compared with other algorithm. The execution time also reduces.

Disadvantages: It cannot include all the nodes. It only finds shortest path based upon the neighboring nodes.

Link state algorithms: It is one of the adoptive routing algorithms which complete its shortest path by linking all the nodes in the tree.

Advantages: It finds out the nodes of the entire topology and then starts counting.

Disadvantages: It uses more memory space for keeping the whole topology information.

Flooding: It is one of the non adoptive routing algorithm in which it is carried out a static routing table for finding path in the network.

Advantages: It searches nodes very efficiently in manner and covers the most nodes quickly in the tree.

Disadvantages: It produces enormous query messages and thus, it does not scale on it. The disadvantage is that flooding algorithm is always taken as a short term search for finding path in the network.

Conclusion

Most probably, all algorithms such as non adoptive routing algorithms and adoptive routing algorithms are used in mobile ad hoc network only. The reviews made a conclusion that the adoptive routing algorithms such as distance vector algorithm, link state algorithm and so on gives better performance metric when compared with the non adoptive routing algorithms such as flooding, shortest path algorithm, random walk and so on. The redundancy is reduced by recomputing the affected areas with changing links in the network for the adoptive routing algorithms.

The redundancy is reduced in the dynamic or adoptive routing algorithm when compared with non adoptive routing algorithms. For non adoptive routing algorithms, most probably, dijkstra's algorithm is used for finding shortest path. It does not give redundancy as such that in the adoptive or dynamic routing

algorithms. Thus, it is concluded that on the basis of the performance metrics like redundancy, computation time, speed, the adoptive routing algorithms are more efficient than the non adoptive routing algorithms.

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