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Dynamic Ant-Genetic Routing Algorithm For MANET

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ABSTRACT

Mobile Ad-hoc networks (MANET) are self-organizing and self-configuring multihop wireless networks, where the structure of the network changes dynamically. This is mainly due to the mobility of the nodes. In static routing, the routes between the nodes are precomputed based on certain factors and are stored in routing table, All packets between any two nodes follow the same path. Because of the dynamic nature of the MANETs the static routing protocols are not suitable. Hence there is a need for a dynamic routing protocol. We introduced a hybrid approach which combines the advantages of the two most popular optimization techniques namely Genetic Algorithm and Ant Colony Optimization in order to reduce the complexities involved in multi-constrained QoS routing for the dynamic environment of MANETs.

Keywords: MANET, Network, Ant Colony Optimization, Genetic Algorithm.

1. INTRODUCTION

Mobile Ad-Hoc Network (MANET) is a purely wireless connectivity through the nodes made by the actions of the network, which usually has a dynamic shape and a limited bandwidth and other features, network members may be inside the laptop, Personal Digital Assistant, mobile phones, MP3 players, and digital cameras and so on. On the Internet, the original Mobility is the term used to denote actions hosts roaming a different domain; they can keep their own fixed IP address, without the necessity of regularly changing, which is Mobile IP technology. Mobile IP nodes in the main action is to deal with IP address management, by Home Agent and Foreign Agent to the Mobile Node to packet Tunneling, the Routing and fixed networks are no different from the original; however, Ad Hoc Network to be provided by Mobility is a completely wireless, can be any mobile network infrastructure, without a base station, all the nodes can be any link, each node at the same time take Router work with the Mobile IP completely different levels of Mobility Early use of the military on the Mobile Packet Radio Networked in fact can be considered the toured of MANET, with the IC technology advances, when the high-tech communication equipment, the size, weight perpetually decreases, power utilization is getting low, Personal Communication System(Personal Communication System, PCS) concept evolved.

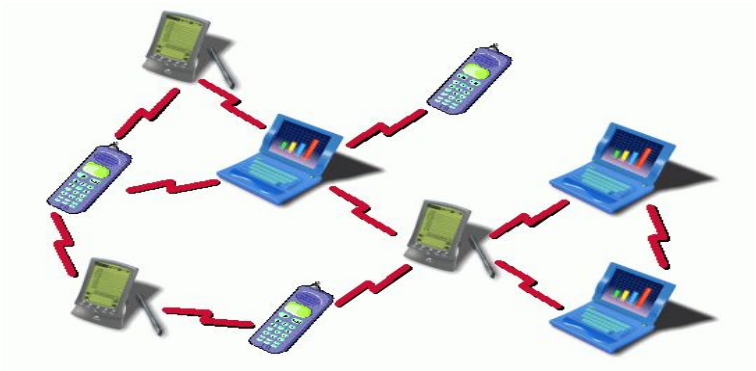

Figure: Mobile Ad-hoc Network [3]

From the past few years the rapid popularization of mobile phones can be seen to communicate with others anytime, anywhere, get the latest information, or exchange the required information is no longer a dream, And we have gradually become an intact part of life. Military purposes, as is often considerable danger in field environment, some of the major basic communication facilities, such as base stations, may not be available, in this case, different units, or if you want to communicate between the forces, we must depend on This cannot MANET network infrastructure extents. In emergency relief, the mountain search and rescue operations at sea, or even have any infrastructure cannot be

expected to concede with the topographical coercions and the pressure of time under the pressure, Ad Hoc Network purely wireless and can be any mobile feature is especially suited to havoc relief operations[1]. When personal communication devices and more powerful, some assembly occasions, if you need to exchange large amounts of data, whether the transmission of computer files or applications that display. If we can link into a temporary network structure, then the data transmission will be more efficient without the need for large-scale projection equipment would not have point to point link equipment (such as network line or transmission line). The current wireless LAN technology, Bluetooth is has attracted considerable attention as a development plan. Bluetooth's goal is to enable wireless devices to contact with each other, if the adding the design of Ad Hoc Network (MANET).

2. LITERATURE SURVEY

In this section the relevant past literature on routing techniques that use in MANET. Most of the researchers concentrate on minimize delay and improve QoS parameters using new routing mechanisms.

2.1 "Ant Colony Optimization Algorithm Based An Intelligent Protocol To Improve QoS of MANETs" by Rajanigandha Metri, Prof. Sujata Agrawal,2014.

Here a new protocol QAMR is introduced based on ant colony optimization algorithm which provides plausible path out of multiple paths for data transmission. This algorithm is scalable, adaptive and efficient. The performance is evaluated using network simulator.

2.2 "Routing issues and challenges for MANETs:A Review" by Ms. Monika kashap, Mr. Sukhvir Singh, Ms. Rimpy Kumari, October – 2013

In this paper they present an overview of MANETs, and their routing protocols and present several challenging issues.

2.3 "Fuzzy Improved Genetic Approach for Route Optimization in MANET " by Jaspal Jindal ,Vishal Gupta, June 2013 .

In this paper A fuzzy improved genetic approach has been implemented and the simulation results have been analyzed. The results obtained from genetic based approach in which fuzzy is applied at the crossover show better path optimization. The analysis tables from the two different approaches show the distance and random path generation. The fuzz improved genetic approach provides energy efficient path which is needed for route optimization in MANET obtained.

2.4 "Significance of Mobile AD-HOC Networks(MANETS)" by Aditya Bakshi, A.K.Sharma, Atul Mishra ,March 2013.

In this paper some fundamentals and significance are covered.

2.5 "Study of MANET:Characteristics, Challenges, Application and Security Attacks" by Aarti, Dr. S. S. Tyagi, May 2013.

In this paper study of mobile ad-hoc network and its characteristics, challenges, application, security goals and different types security attacks at different layers.

2.6 "Hybrid of ant colony optimization and genetic algorithm for Shortest path in wireless mesh networks" by S.Aravindh and Mr.G.Michael, january 2012.

Routing in dynamic network is a challenging one, because the topology of the network is not fixed. This issue is addressed in this presentation using ant algorithm to explore the network using intelligent packets.

2.7 "GOM: New Genetic Optimizing Model for Broadcasting Tree in MANET" by Said Elaiwat , Ammar Alazab, Sitalakshmi ,Venkatraman, Mamoun Alazab, 2010.

The aim of this work is to propose a new genetic model using a fitness function with the primary goal of finding an optimal broadcast tree.

2.8 "Novel dynamic ant genetic algorithm for QoS routing in wireless mesh networks" by Xue-Mei Sun, Xiao-Yu Lv. 2009.

In this paper, adopt a novel dynamic ant genetic hybrid algorithm to solve QoS unicast routing problem for wireless mesh network, whose innovation are using the best melting point evaluation strategy to control the calling of the two algorithms dynamically. Simulation results show that the novel algorithm is superior to the genetic algorithm and the static ant genetic hybrid algorithm in quality and efficiency for QoS routing in wireless mesh network.

3. METHODOLOGY

3.1Ant Colony Optimization Algorithm

Ant colony optimization is a meta-heuristic technique that uses artificial ants to find solutions to combinational optimization problems[6]. Ant Colony Optimization (ACO) is based on the demeanor of real ants and possesses enhanced skills such as memory of past actions and cognition about the distance to other locations. In nature, an individual ant is unable to communicate or emphatically rake for food, but as a group, ants possess the skill to solve tangled problems and successfully find and collect food for their colony. Ants communicate using a chemical substance called pheromone[6]. As an ant travels, it emits a fixed amount of pheromone that other ants can imitate. Each ant

moves in a somewhat random fashion, but when an ant encounters a pheromone trail, it must decide whether to follow it. If it follows the trail, the ant's own pheromone reinforces the existing trail, and the increase in pheromone increases the possibility of the next ant choosing the path. Therefore, the more ants that travel on a path, the more attractive the path becomes for subsequent ants. Additionally, an ant using a short way to a food source will return to the nest sooner and therefore, mark its path twice, before other ants return. This directly influences the selection possibilities for the next ant leaving the nest.

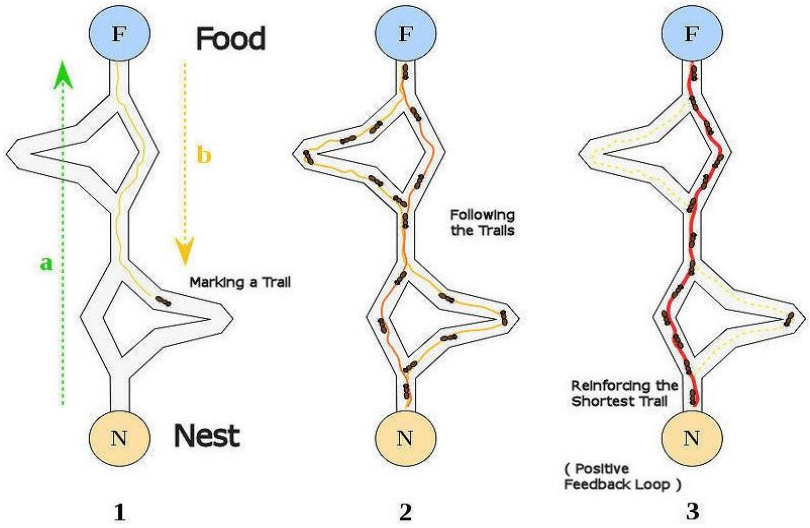

Figure: Ant colony optimization

3.2Genetic Algorithm

In Genetic Algorithm (GA), the searching and optimization techniques are based on variation and selection[6]. Once you can encode solutions of a give problem to chromosomes in GA, and it can compare the relative performance (fitness) of solutions. The significance of genetic algorithm is based on the principle evolution of routes rather than storing the precomputed routes.

Genetic Algorithm (GA) is a programming technique that delineates the biologically evolution as the problem solving technique. Genetic Algorithm works on the search space called population[7]. Each element in the population is called as chromosome. GA begins with randomly selecting set of viable solution from population. Each chromosome is a solution by itself. Each chromosome is evaluated for fitness and this fitness defines the quality of solution. Genetic Algorithm uses adaptive heuristic search technique which finds the set of best solution from the population. New consequences are generated from the chromosomes using operators like initialization, recombination, selection, crossover and mutation. Most fit chromosomes are moved to next generation. The weaker candidates get less chance for moving to next generation. This is because of Genetic Algorithm is based on the principle of Darwin theory of evolution, which states that the "survival is the best". This process repeats until the chromosomes have best fit solution to the given problem[8]. The summary is that the average fitness of the population increases at each iteration, so by repeating the process for many iterations, better results are discovered.

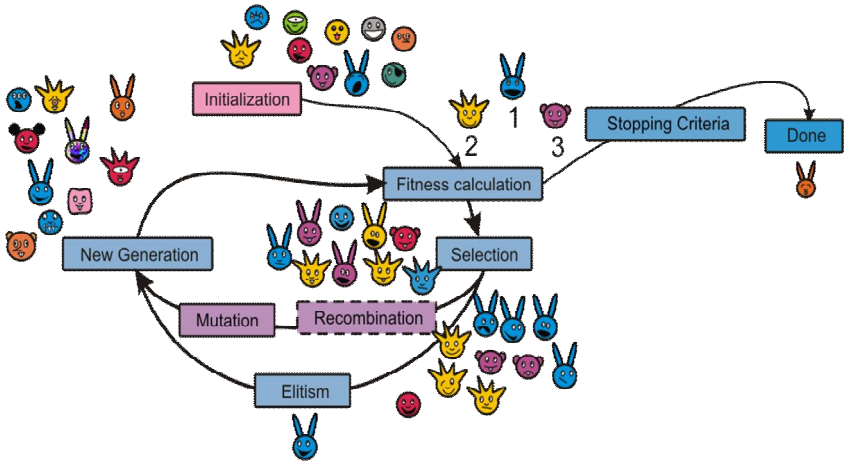

Figure: Genetic Algorithm

4. CONCLUSION

The Process of selecting best path in a network that is Routing in dynamic network is a challenging one, because the network topology is not fixed. This issue is in this presentation using ant algorithm to explore the network using intelligent packets. The paths generated by ants are given as input to genetic algorithm. The genetic algorithm finds the set of optimal path. The importance of using ant algorithm is to reduce the size of routing table. Genetic algorithm is based on the variation and selection.

In this work ant colony optimization algorithm and genetic algorithm are used for routing in MANET networks. Ant algorithm, is found to reduce the size of routing table that is optimize selecting path in network. Genetic algorithm cannot use global information of the network. Hence, the combination of these two algorithms, which makes the packets to explore the network independently, helps in finding path between pair of nodes effectively. The proposed algorithm creates initial population, forwards forward ant, access fitness, generate new population using routing table.

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