

APPLICATIONS OF GENETIC ALGORITHMS IN MANET

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Abstract- Mobile ad hoc network is self-organized, decentralized, infrastructure less, wireless network in which topology of the network may change continuously with time. Genetic algorithms (GAs) is a well-established framework for implementing optimization. Thus, GA forms a candidate for finding optimal path between the source and destination during routing. This survey explores the benefits of using GA in solving routing problem in Mobile Ad-hoc Network (MANET). We begin by presenting general concept in GA and conclude with the application of GA in MANET.

Keywords –MANET; routing; Genetic Algorithm

1. INTRODUCTION

MANET is a self-organized, framework less system, where every gadget can send and receive information, with free portability. A MANET is an ad hoc network that can change areas as well as design. MANETS are versatile, they utilize remote associations with interface with different systems and this can be a standard Wi-Fi association, or another medium, for example, a cell or satellite transmission [1]. A hereditary calculation (GA) is a metaheuristic computational strategy, enlivened from natural advancement, that intends to mirror the vigorous methods utilized by different organic life forms to adjust as a feature of their normal development. There are a few GAs that address various types of directing issues, for example, multipath or multicast steering issue. This paper examines couple of hereditary calculations that are utilized to tackle the dynamic defeat revelation issue in MANETS. A concise knowledge into Genetic Algorithm is given in section II and the applications of Genetic Algorithm in outlining directing conventions is discussed in section III which is followed by conclusions.

2. GENERAL ALGORITHM

2.1 Genetic Algorithm –

Genetic Algorithm [3] is an optimization and evolutionary algorithm that solves optimization problems. The aim is to solve the optimization problem in IP networks using genetic algorithm. The solution starts with finding alternative paths to alternate the overloaded path using genetic algorithm. A genetic algorithm works on a population of possible solutions as compared to other heuristic methods that use a single solution in their iterations. Genetic algorithm is stochastic, not deterministic. It simulates the survival of the fittest among individuals over consecutive generations. Each individual represents a point in a search space and a possible solution. At each generation, populations of certain characteristics are selected and are then made to go through a process of evolution. These processes are repeated until the best genes, which have the fittest capability, are obtained.

A simple genetic algorithm consists of the following steps[4]:

1. [*Initial Population*] First generation is randomly generated, by Generate random population of n chromosomes.
2. [*Fitness*] Evaluate the fitness $f(x)$ of each chromosome x in the population.
3. [*New population*] Create a new population by repeating following steps until the new population is complete
 - a) [*Selection*] Select two parent chromosomes from a population according to their fitness (the better fitness, the bigger chance to be selected)
 - b) [*Crossover*] With a crossover probability cross over the parents to form a new offspring (children). If no crossover was performed, offspring is an exact copy of parents.
 - c) [*Mutation*] With a mutation probability mutate new offspring at each locus (position in chromosome)
 - d) [*Accepting*] Place new offspring in a new population
4. [*Replace*] Use new generated population for a further run of algorithm
5. [*Test*] If the end condition is satisfied, stop, and return the best solution in current population
6. [*Loop*] Go to step 2

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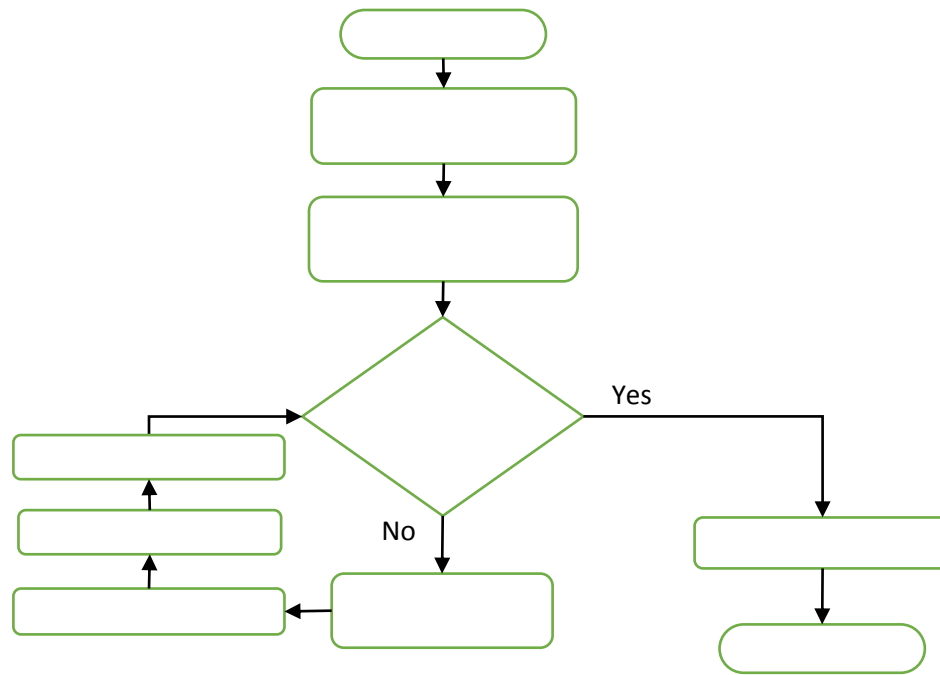


Figure 1.0 Genetic Algorithm Flowchart

GAs work on principle of natural selection, they simulate the survival of the fittest among individuals over consecutive generation while solving a problem. They can be considered for evolutionary optimization technique suitable for non-linear discrete problems.

3. THE APPLICATIONS OF GENETIC ALGORITHM IN MANET

Over the past few years, different GA based plan strategies have been proposed. Some of these strategies are discussed in subsequent sections[2]:

3.1 Solving the dynamic multicast problem in MANET[3]-

In MANET the topology continues change due to its natural qualities. such as node mobility and energy conservation. An effective multicast algorithm should track the topological changes and adapt the best multicast tree to the changes accordingly. Genetic algorithms with immigrants schemes can be used to solve the dynamic QoS multicast problem in MANETs. The immigrants based genetic algorithms can quickly adapt to the environmental changes (i.e., the network topology changes) and produce high quality solutions following each change

3.2 Energy-efficient based multicast routing [4]-

In ad hoc networks, battery power of every mobile node is limited. Battery energy is one of the important constraints while designing multicast routing protocols. An energy efficient genetic algorithm mechanism can be used to resolve this problem. With only few selected nodes, GA can be used to design a source-tree based routing algorithm and build the shortest-path multicast tree. As compared to the other algorithms, the delay time of such an algorithm is minimal owing to the use of small population size.

3.3 GA in routing optimization in Ad hoc Network[5]-

The topology of Ad hoc networks changes rapidly and demands a highly adaptive routing scheme to deal with such a rapid change. Clustering algorithm used to improve the routing can be based on both Clusterhead gateway switching protocol (CGSR) and the mechanisms of a genetic algorithm (GA). The GA based algorithm can quickly achieve self-configuration and efficiently adjust to an ever changing local topology. This results in fewer link breakages. Also GAs are able to find if not the shortest, at least a very good path between source and destination nodes in MANETs

3.4 QoS Route Selection for Mobile Ad-hoc Networks[6]-

Designing QoS based protocol for mobile ad hoc networks is really challenging as it involves, selecting most optimal route from source to destination that satisfies the specified qualities. GA based algorithms can be used to find optimal route between the source and destination satisfying the qualities such as bandwidth, node delay, end-to-end delay and node connectivity index.

4. CONCLUSION

Genetic Algorithms are meta heuristic calculation system in light of fittest of survival. In this paper we have sketched out the essential advances engaged with Genetic calculation and have displayed different uses of Genetic calculations in taking care of the steering issues in MANET. We can presume that by applying Genetic calculations for taking care of steering issues in MANET, we can productively accomplish improved QoS based directing in ad-hoc networks.

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