

REVIEW OF ROUTING ALGORITHM FOR MANET BASED ON OPTIMIZATION TECHNIQUES

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Abstract: Mobile Ad-hoc Network is very broadly used in many applications. A MANET is an autonomous collection of mobile users that communicate over relatively bandwidth constrained wireless links. Since the nodes are mobile, the network topology may change rapidly and unpredictably over time. Sensor networks still have problems in conveying data from one sensor node to other node. Routing algorithms are developed for wireless sensor networks. MANETs are mostly used for communication purposes and to transfer data from one device to another device through internet. But both are different in many points. Nodes used in WSNs have very limited memory power and are of very high magnitude i.e. in order of many hundreds, as compared to MANETs. For WSNs communication is not very big issue, but collecting data is more important, while in MANETs communication is the only purpose. Routing efficiency is to management entire network energy. Optimization technique is most important research area in networking. In this proposal we have survey with various routing algorithm for MANET based on optimization algorithm, Like ACO, LOA, BOA, WOA, ISRA.

Keywords: Network, MANET, Optimization Technique, Sensor Node, Routing Algorithm.

I. INTRODUCTION

Most of the research in MANETS has been focused on Routing issues. Security on the other hand has been given low priority. This paper provides an introduction to Mobile Ad-hoc Networks, Routing related issues and overview of security problems for MANETS, by distinguishing the threats on the basic mechanisms and security mechanisms. It then addresses the possible solution to protect the security mechanism, which involves availability, integrity, authentication and non repudiation. These securities related issues are well addressed if one can provide methods that are pertinent for authentication, key distribution, and intrusion detection and rerouting in case of Byzantine failure in MANETS.

Various Optimization approaches can be used to find the optimal and best solution. For optimization biologically

inspired algorithms is the category of algorithms that resemble with the performance of nature. By these algorithms various problems can be solved due to their advantages: First, to reach a solution, we don't have to follow any mathematical approaches. Second, results come very fast and are accurate. Optimization approaches which fall into the category of these algorithms are:

- Lion Optimization Algorithm
- Particle Swarm Intelligence
- Ant Colony Optimization
- Whale optimization algorithm
- Artificial Bee Colony Optimization Artificial Neural Networks
- Bacterial Foraging Algorithm

Various optimization techniques can be used to find out the best and optimal solution. Nature inspired algorithms are meta heuristics that mimics the nature for solving optimization problems opening a new era in computation.

II. RELATED WORK

In [2], Ant Colony Optimization (ACO) algorithm which is inspired by the nature. In MANETs, the routing algorithms are developed easily by this technique. In this technique, the autonomous agents interact with each other and their collective behaviors studied to reach a given solution by finding the best global solution. Algorithm based on energy efficient routing is proposed for MANETs to extend the lifetime of overall system by minimizing energy consumption of nodes.

The performance of FCM is enhanced by several optimization algorithms, so as to support the FCM from convergence at local minima. In [3], the data clustering is performed by combining FCM and invasive weed optimization algorithm. The investigations on bio-inspired algorithms are unstoppable and certain combinations of algorithm prove better performance. Ant Lion Optimization algorithm describe the hunting mechanism of ant lions in nature. Five main steps hunting prey such as the random walk of ants, building traps, entrapment of ants in traps,

catching preys, and re-building traps are implemented. It can be concluded that the proposed algorithm benefits from high exploitation and convergence rate. ALO can be concluded from the results of multimodal and composite test functions which is due the employed random walk and roulette wheel selection mechanisms [4].

The collective and social behavior of living creatures motivated researchers to undertake the study is Swarm Intelligence. Particle Swarm Optimization (PSO) is initially introduced for simulating human social behaviors [5].

WOA is an optimization algorithm that imitates the whales [6]. By nature, the whales attack a shoal of fish that swim around the whale in the scope of a circle by forming bubbles. The shoal of fish is enclosed by the bubbles and the attack is performed in two phases. They are exploitation and exploration phases. The exploitation phase is meant for enclosing the prey within a circle and the exploration phase searches the fish in a random fashion. In [7], this paper proposes an artificial neural network optimization technique which is used in reactive AODV routing protocol. In this the frequency of the Hello interval between two events is determined to check the network performance. Unnecessary traffic may occur due to updating information at some time interval. So to improve the performance of the network, we have to make the time interval of these messages to be adaptive. Information update at some fixed time interval can cause unnecessary traffic in the wireless network so to make adaptive the time interval of these messages is a technique to improve the performance of the network.

III. PROPOSED OPTIMIZATION ALGORITHMS FOR MANET

MANETs are mostly used for communication purposes and to transfer data from one device to another device through internet. But both are different in many points. Nodes used in WSNs have very limited memory power and are of very high magnitude i.e. in order of many hundreds, as compared to MANETs. For WSNs communication is not very big issue, but collecting data is more important, while in MANETs communication is the only purpose.

Whale optimization algorithm

The whales attack a shoal of fish that swim around the whale in the scope of a circle by forming bubbles. The shoal of fish is enclosed by the bubbles and the attack is performed in two phases. They are exploitation and exploration phases. The exploitation phase is meant for enclosing the prey within a circle and the exploration phase searches the fish in

a random fashion. The behaviour of whales is modelled as follows.

$$K = |CV_1 \cdot \vec{A}^*(i) - \vec{A}(i)|$$

$$\vec{A}(i+1) = \vec{A}^*(i) - \vec{CV}_2 \cdot K$$

In the above equations, i denotes the current iteration, A^* is the best result attained and the position vector is represented by A . The absolute value is represented by $||$ and dot product $(\cdot)$ is performed for all elements. CV_1 and CV_2 are the coefficient vectors, which are calculated as follows.

Ant Colony Optimization

ACO is the Meta heuristic technique which is inspired by foraging behavior of ants. This optimization technique was proposed by Dorigo and DiCarlo in 1999. In this three main functions are structured:

- Ant Solution Construct: In this artificial ants move through adjacent states of problem.
- Pheromone Update: Once the solution is built completely, pheromone trails are updated.
- Daemon actions: In this additional pheromone is applied to the best solution.

Particle Swarm Optimization

PSO is a population based stochastic optimization technique and was proposed by Kennedy and Eberhart in 1995. This technique is inspired by group behavior of bird flocking and fish swimming. In PSO, each member is represented by particle having velocity and position of each of them. The particle's best position is evaluated by the highest fitness value.

Various steps involved in PSO algorithm are as:

- Initialize the particle in a given search space.
- Evaluate the performance of each particle.
- Compare the particle's fitness value with pbest. If the value of particle is better than pbest then set this value as pbest
- Update the position and velocity of particles.

Artificial Bee Colony Optimization (ABC)

Based on the behaviour of the bees in nature, various swarm intelligence algorithms are available. This algorithm is based

on the foraging behaviour of honeybee swarm and was proposed by Basturk and Karaboga. These algorithms are classified into two; foraging behaviour and mating behavior. In ABC algorithm there are mainly three groups of bees: Onlookers, Employed, Scouts.

IV. COMPARISON OF OPTIMIZATION ALGORITHMS

In this paper different routing protocols, which are developed for wireless sensor networks. an idea for developing a new protocol for sensor networks with the help of other routing protocols, which were basically developed for ad-hoc network. Following table describe the network specification.

Table:1 Simulation Parameter

Parameters	Specifications
Network Size	300 × 300
Number of Nodes	10/50/100/
Communication Range	50 to 200
Speed	512
Simulation Period	100 PS
Node moving Range	50-100

Table 2. Performance analysis of the proposed approaches

	PDR (%)	Average Latency (%)	Throughput (%)	Energy Efficient (%)	Network life Time (%)
WOA	65.5	62.3	72.5	56.3	90.8
ACO	68.4	58.1	76.4	54.0	93.2
ABC	70.2	52.6	79.2	50.3	94.6
PSO	78.6	50.1	82.4	48.4	96.3

The above analysis describes the new proposal results compared with previous works. The results is found that the PSO approach prove better than exist approach. Packet Delivery Rate of work is measured. On that analysis PSO has better packet rate start to diminish as the count of nodes increased. The average latency with 13 seconds for node 100 and prove best performance

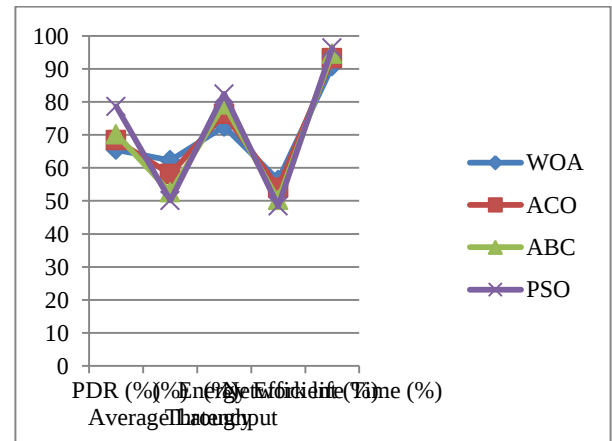


Fig: 1 Performance Analysis

V.CONCLUSION

Optimization is the basic criteria for finding optimal and best solution from the possible outcomes. There are various optimization techniques available and could be applied accordingly to give the better results. Main focus is on optimization approach which makes the network more reliable, efficient and without any loss of original link during data transmission. These optimization schemes should be used according to the scenario.

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