AODV Extension Using Genetic Algorithm in VANET

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Abstract: *VANET is an advance technology in which vehicles are used as mobile nodes to create a robust wireless ad-hoc network. VANET is an extended form of MANET, but moving nodes are vehicles in it. Routing protocols are the backbone of VANET. But due to its self organizing nature it degrades the performance and QoS. Thus, some optimization on network routing strategy is required. In this paper, we applied the genetic algorithm to enhance the performance of AODV. The goal of this paper is to find optimal path from source to destination and to increase the throughput of AODV. Thus our proposed algorithm has shown the better results by considering performance parameters like throughput, packet delivery ratio, packet loss. Simulation results show that the proposed algorithm is more efficient and improves the QOS.*

Keywords: Ad hoc On Demand Distance Vector (AODV), Genetic Algorithm (GA), Mobile Adhoc Network (MANET), Quality of Services (QOS), Vehicular Ad-hoc Network(VANET)

1. Introduction

Vehicular Ad-hoc Network(VANET) may be a special class of mobile adhoc-Network that is employed to enhance the road safety by providing info regarding Traffic- jams, Road-Blockage and economical path that decrease the time of human. VANET differs from MANET in terms of following characteristics that area unit high quality, dynamic topology, self-organized design, distributed communication, path restrictions and variable topology size[1]. VANET give the data between moving vehicles. In VANET, this whole act router to exchange the data. it\'s of 2 varieties vehicle to vehicle and vehicle to road facet as a result of new technology it\'s the key analysis space of business and educational.

AODV is the largely used protocol in VANET that is self organizing dynamic in nature however there are numerous issues in AODV like high Packet loss, low output and Packet delivery quantitative relation. To reinforce the performance of AODV in VANETs numerous optimizations techniques are often applied. This paper projected for resolution the best path routing drawback exploitation genetic algorithmic rule that improve the performance of AODV. Genetic algorithmic rule may be a programming ways and analysis of drawback resolution methodology. The genetic algorithmic rule then evaluates every candidate to fitness perform. This algorithmic rule is better of the looking algorithmic rule.

2. Related Work

Lot of enhancements has been made to improve the QOS of routing protocols. These enhancements are made on the basis of VANET parameters to improve the performance of AODV. AODV protocols are designed to provide the desired QOS on a route to be established. The real time applications focus on QOS parameters such as packet loss, throughput and Packet delivery ratio.

[2] presents the implementation and analyze the performance of AODV in VANET with respect to various parameters like Throughput, Packet size, Packet drops, End to End delay etc in three different scenarios of node density. For this MOVE is used along with NS2 and SUMO. Then graphs are plotted using Trace graph for evaluation.

[3] addresses comparative study of all the existing enhanced AODV routing protocols using different performance metrics and then found that the enhanced AODV protocols performed inadequate for some of the performance metrics.

[4] presents a routing protocol for mobile ad hoc network using genetic algorithm. The proposed scheme for genetic algorithm to find the optimal path from source and destination node. The genetic algorithm then evaluates each candidate to fitness function. In this paper, simulation is based on two different routing technique in MANET using simple or traditional AODV routing and an enhanced routing using Genetic Algorithm (GA) technique, and results shows that AODV using GA have better performance than traditional routing.

3. Problem Formulation

Implement Adhoc-on-demand mistreatment Genetic Algorithm(GA)
- To implement AODV with GA
- To increase the output by increasing the throughput, packet delivery ratio.
- To decrease the Packet loss.
- To Analyze the projected system mistreatment on Matlab.

Genetic algorithm (GA) is a subclass of evolutionary algorithms (EA) which generate solutions to optimization problems using techniques inspired by natural evolution such as selection, crossover and mutation. The genetic algorithmic rules then evaluates every candidate to fitness n and then perform crossover and mutation to find optimal path.

A genetic algorithm requires:
a. A genetic representation of the solution domain.
b. A fitness function to evaluate the solution domain

3.1 Algorithm

With the aim of improving the quality of service of AODV using Genetic Algorithm the following steps are carried out.
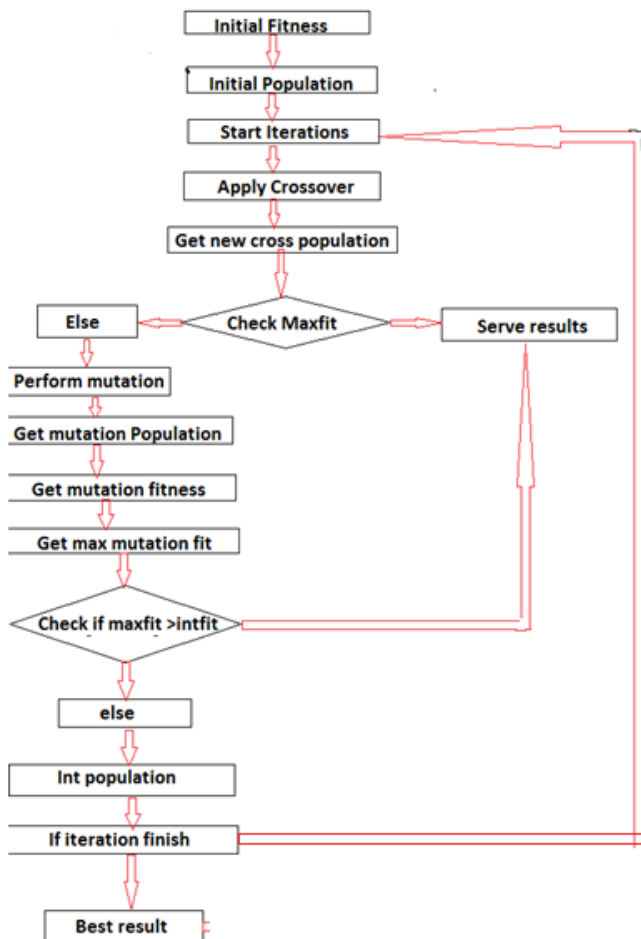

Figure 1: Algorithm of AODV using GA

3.2 Simulation and Performance Analysis

In this section, we tend to analyses the performance of our algorithmic rule

3.2.1 Performance Matrics
a. **Throughput:**
It is the entire variety of packets received by the destination from the supply in an exceedingly given time. It's typically measured in bits per second.

b. **Packet Loss:**
Packet loss happens once one or additional packets of knowledge travel across a network fail to achieve their destination.

c. **Packet Delivery Ratio:**

It is the quantitative relation of variety of packets received at the destinations and therefore the variety of knowledge packets sent by the sources.

3.2.2 Result Analysis
The scenario used in the simulation constructs the 50 nodes and 5 malicious nodes under the area of network and specifies the source and destination node. Simulation is done using MATLAB. In this work, we are improving the AODV with optimization technique i.e. genetic algorithm to improve the quality of service (QoS) and performance. In the graphical representation, BLUE graph line shows for simple AODV and RED graph line shows for genetic AODV. The graphs shown below of throughput, packet delivery ratio, packet loss of genetic AODV are batter then simple AODV.

a. **Throughput**
Throughput is the measure of how fast we can actually send packets through network. The number of packets delivered to the receiver provides the throughput of the network. The throughput is defined as the total amount of data a receiver actually receives from the sender divided by the time it takes for receiver to get the last packet.
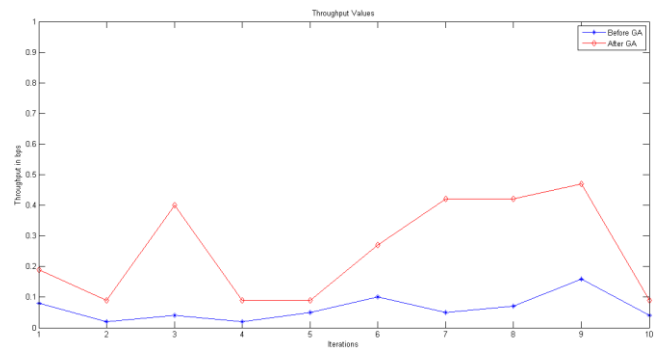

Figure 2: Throughput

b. **Packet Delivery Ratio**
The ratio of the data packets delivered to the destinations to those generated by the CBR sources. It is the fraction of packets sent by the application that are received by the receivers.
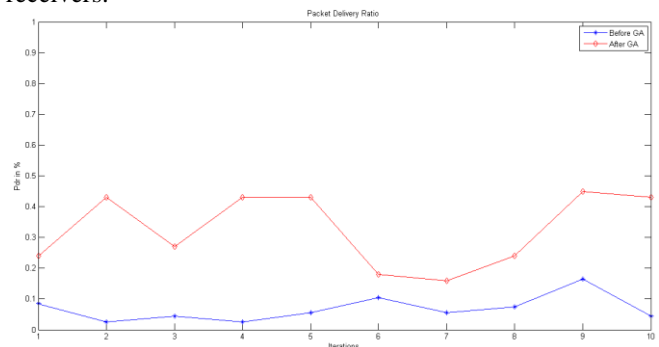

Figure 3: Packet Delivery Ratio

c. **Packet Loss:**
Packet loss is the failure of one or more transmitted packet to arrive at their destination.
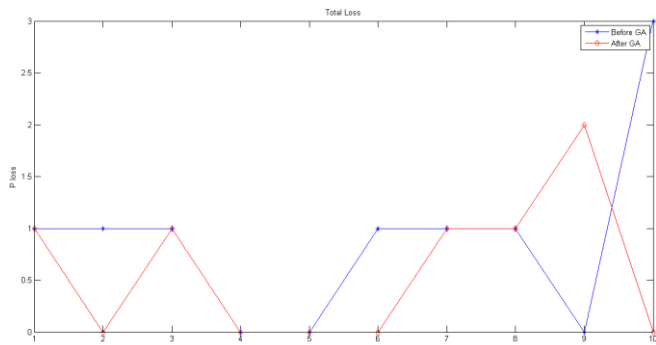
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Figure 4: Packet Loss

d. Comparison between AODV before GA and AODV after GA.

In the bar graph representation BLUE color represents the output of AODV before GA and RED colour represents the AODV after GA. Results shows that the performance of AODV with generic algorithm (GA) is battee then AODV without genetic algorithm (GA).
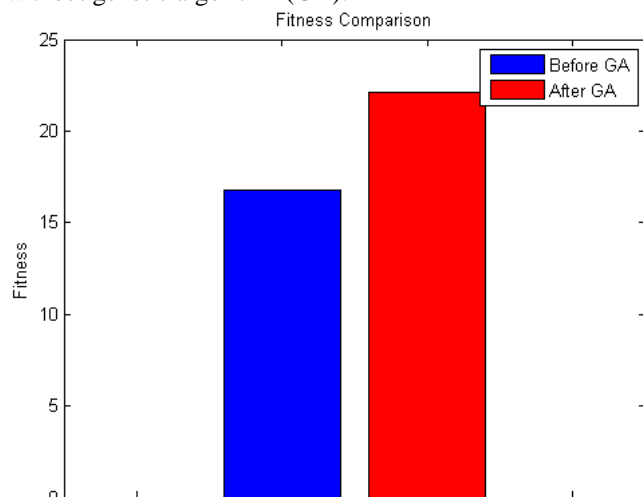

Figure 5: Comparison between AODV before GA and AODV after GA.

4. Conclusion

VANET (Vehicular Ad-hoc Network) is a new technology which has taken enormous attention in the recent years. It is the special type of MANET which has the high mobility, self-organized, dynamic in nature. In this, Vehicles act as nodes to share data. The basic task of VANET is to provide information about Traffic- jams, Road-Blockage and efficient path which decrease the time of traveler. To achieve these objectives, algorithms must be efficient. In this research, Genetic algorithm is used to improve the efficiency and quality service of AODV. Firstly, some scenarios are generated then GA is to be applied on AODV. The research concludes that genetic AODV is better than simple AODV; this conclusion is made on the basis of some parameters like throughput, packet loss, packet delivery ratio.

5. Future Work

The present thesis work point to following directions of research that are likely to be needed to further enhance the scope of the system.

- Optimization Technique other then Genetic algorithm can be used.
- In this only one optimization technique has been used, but this work can be optimized in future by using more than one optimization technique.
- Various other parameter s can be enhanced to improve the network.

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