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PERFORMANCE IMPROVEMENT IN MANET USING NEURAL NETWORK

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ABSTRACT

Mobile Adhoc Network is a self-directed, substructure-less, self-assembling and self-alterative system of mobile nodes connected up by wireless links. The nodes are free to travel around by random and may connect or leave the network. Appropriate nature of the nodes and the undependable nature of some nodes in a MANET, a vital issue of uniform performance of such a network arises. The idea of this paper is discovering an optimum method to set up an best path between a couple of nodes and observe the selfish nodes in MANET by using neural network. The application of Genetic Algorithm based back propagation networks are used in detecting the selfish nodes. Since the misbehaving nodes are successfully detected .This betters the functioning of a routing protocol as in most of the poor performing networks, the incapable nodes are the major reason. Sometimes the routes originated by Genetic Algorithm are not the eventual best routes hence to more make sure the maximum optimality in the routes found out, Ant Colony Optimization former is used.

KEYWORDS : DSR protocol, Genetic algorithm with back propagation, Fitness function, packet delivery ratio, Packet drop, Throughput,

1.INTRODUCTION

Mobile Ad hoc Networks set up a new Communication model, which does not want a unchanging Infrastructure they dependence on wireless terminals for routing and transfer services. Nodes trust on each other to be the Network linked and to move information. Routing is the process of transfer packets from starting node to ending node.The routing conception mainly requires two Steps. First, find out the optimal routing path and then Move the information packets from beginning to end of the network. Routing protocols use a number of metrics to compute the best path for routing the packet to its destination. These metrics are a normal measurement that might be, for example, number of hops, which is used by routing algorithm is used to find out the optimal path for the packet to its end.Routing is generally classified into static routing and dynamic routing. Static routing upholds a routing table. Dynamic routing up-to-date routing information.

2.LITERATURE SURVEY

Mobile ad hoc networks (MANETs) represent complex dispersed systems that include wireless mobile nodes that Can move freely and dynamically [1]-[3]. DSR protocol adjusts fastly to routing modifies when host movement is common, yet need small or no overhead throughout periods in which hosts move less frequently[4]-[6]. Using Genetic Algorithm we can reduce the calculation accuracy and obtain a marked improvement over raw classification[7]. A new on demand QoS routing algorithm "Ant Routing for Mobile Ad Hoc Networks based on ant colony met heuristic. The algorithm will be very adaptive, capable, scalable and mainly fall end-to-end delay in high mobility cases[8]-[9]. Performance depends on the value of dissimilar parameters, like number of nodes and movable links. Multi-path routing provides the use of various paths for routing among a source-destination pair[10]. A study on the wireless link QOS improvement using ant colony optimization and soft computing techniques helps in finding appropriate schemes wireless networks[11]-[12].

SIMULATION FRAMEWORK

i.Network simulator

ns is an object oriented simulator aimed at network research . Physical activities are translated to events. Components of ns are simulator itself and network animator (nam). It uses two languages because simulator has to do two different things . one thing is simulations of protocols requires a system programming language .c++ for packet processing. Otcl for simulation setup. ns trace the packets on all links.

ii. Protocol classification

Proactive:

The nodes keeps a table of routes to each destination in the network, designed for such reason they regularly exchange messages. Disadvantage of this type of algorithm is wastage of bandwidth and network resources due to Keeping of routes information up-to-date to all destinations, even if they are not used.

Reactive:

These protocols were considered to overcome the maintaining of unused routes. Routing information is obtained just at what time there is a required for it. The required routes are considered on require. This saves the overhead of keeping unnecessary routes at every node, however on the former use the latency for transferring data packets will significantly increase.

Dynamic Source Routing Protocol Dynamic Source Routing protocol is a straightforward and well-organized routing protocol considered particularly for make use of in multi-hop wireless ad hoc networks of movable nodes. DSR permit the network to be fully self-forming and self setting up, lacking the need for any presented network infrastructure or governing. It means the source have to know the entire series to the destination. Every node holds a route cache, when all routes it knows are stored. In Dsr the sender determines the entire path from source node to destination node and it places the addresses of intermediate nodes of the route in the packets. The protocol consists of two most important operations like "Route Discovery" and "Route Maintenance".

Route discovery: The source node finds its route cache to decide if it already holds a route to the destination or not. If the source contains a suitable route to its destination then it transfers the packets from that route. If it does not contain a valid route it discovers the route by broadcasting a route request message (RREQ) which contains source and destination address and unique id number. If any intermediate node contain path address to destination node will send route reply (RREP). The intermediate nodes which further broadcast the route request packets also add their own identity in the header of route request packet.

Route maintenance: It handles route breaks. When a node finds a transmission problem in data link layer, then the node removes that particular route from its route cache and gives a error message to each node that has send packets routed over broken link.

iii. NEURAL NETWORK

Neural networks are computational models based on neural connection of human brain. It consist of a huge number of highly organized processing elements. This network composed of three layers Input layer, one are more Hidden layers Output layer. The input layer distributes the values they receive to the next layer. The signals from Input layer are multiplied by the weights. Weights can also be negative. Depending on weights the calculation of the neuron will be different. Hidden layer supports in performing useful intermediatary calculation before directing input to output layer. Hidden and output layer have a threshold in addition to the weights.

3.PROPOSED METHOD

Genetic algorithm based back propagation network

Genetic algorithm, which is a adaptive search algorithm based on idea of natural genetic natural selection. It direct back propagation network in finding the required connections in order to improve the speed of training. Back propagation is a systematic method of training multilayer artificial neural networks. It is probably the most well know and widely used among the currently available neural network. It makes use of gradient descent learning to obtain their weight. GA is collected of two procedures. The first process is a collection of entities for making of next generation. In the second process, crossover and mutation techniques are used to manipulate the selected entities to form a next generation.GA set out with a population of random strings representing design. Each string is estimated to find the fitness value. Fitness function gives the information how good each candidate is. Based on the Fitness function population is evaluated and ranked. Mainly three operations reproduction, crossover, mutation are performed on population to create a new population of points. Chromosomes are chosen from the population to be parents to crossover. According to this the best ones should survive and create a new offspring. Chromosomes consist of sequences of positive integers which represents IDs of nodes through which routing path passes. Reproductive operator is called selective operator. Crossover is a process of exchanging random bits between two strings of intermediate population. Mutation operator alter randomly some bits of new string.

Ant colony optimization

Swarm intelligence is a moderately new method for problem solving that takes idea from the communal activities of insects and of other animals. The Ant Colony Optimization (ACO) is a met heuristic algorithm, based on generic problem representation and the description of the ant's behavior.

Evaluation of fitness function

The fitness function F(X) is defined as follows:
F(X)=PDR/K-K*[NO+AD+PD]

Where NO=Normalized overhead
AD=Average end to end delay
PD=Number of packet drop
PDR=Packet delivery ratio
K=proportionality constant used for the optimization

proposed algorithm

Genetic Algorithm

Step I. Simulate the network using the DSR protocol.
Step 2. After the simulation, analyze the Trace file. This gives the number of different paths for the same source
and destination pair.
Step 3. Choose two paths PI & P2 for the same source and destination pair with the equal number of nodes 'n'.
Step 4. Calculate the Routing Load (RL) MAC Load (ML), Packet Delivery Ratio (PDR), End-to-End Delay (D), and number of packets dropped, for the selected path.
Step 5. Apply fitness function on the path chosen in step 3.
Step 6. Apply crossover on the path chosen in step 3 at random site.
Step 7. Apply mutation after crossover on the path chosen in step 3 on the randomly chosen site.
Step 8. Step 6 gives two new paths P'1 & P'2 with one new node as compared to the old path. Let the new node in path P'I be n'l and in P'2 be n'2.
Step 9. If n' 1 belongs to network topology then apply the fitness function on the respective path otherwise discard
the path.
Step 10. Do the same for node n'2 as in Step9.
Step 11. Consider the path with the highest fitness function value and:-
{
Respective path will be the optimal path for the given source and destination pair. The node replaced from the previous path is the misbehaving node.
}

Ant colony optimization

Step 1: Calculate the probability of selection of newly generated path that are obtain by applying genetic algorithm for the given source-destination pair. The path will be selected with the higher probability.

$$P_{i,j} = \frac{[\tau_{i,j}]^{\alpha} * [\eta_{i,j}]^{\beta}}{\Sigma[\tau_{i,j}]^{\alpha} * [\eta_{i,j}]^{\beta}}$$

$$\eta_{i,j} = \frac{PDR}{k}$$

$\tau_{i,j}$ → pheromone on the link.
$\eta_{i,j}$ → visibility factor of the link.
k → k is a constant used for optimization and lies between 0 and 1
α,β → are the stable aco optimization
constants

Step 2: The backward ant collect of the secretion and also the evaporation of secretion take place, now we determine the updated pheromone after the evaporation,

$$\Delta\tau_{i,j} = \frac{FF}{K}$$

$\Delta\tau_{i,j}$ → accumulated pheromone on the
link.
FF → Fitness Function
k → proposnality

$$\tau_{new} = \rho * \tau_{old} + \Delta\tau$$

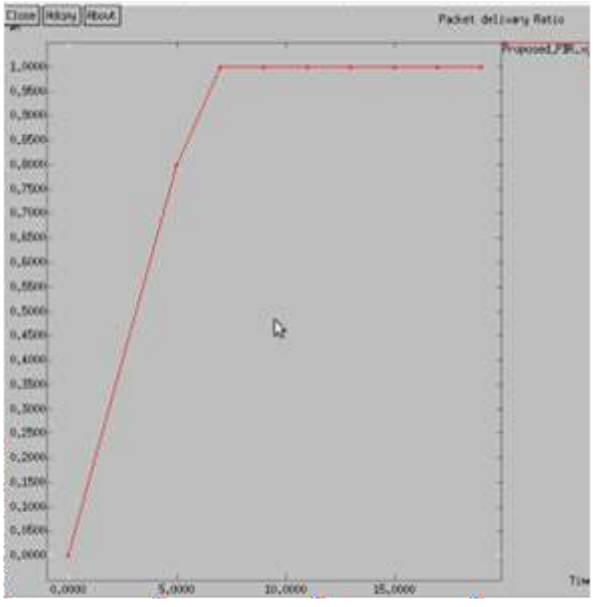
Step 3: The path with the high path partiality probability will be considered as the most excellent path and the data transmission can be started along that path.

Simulation environment

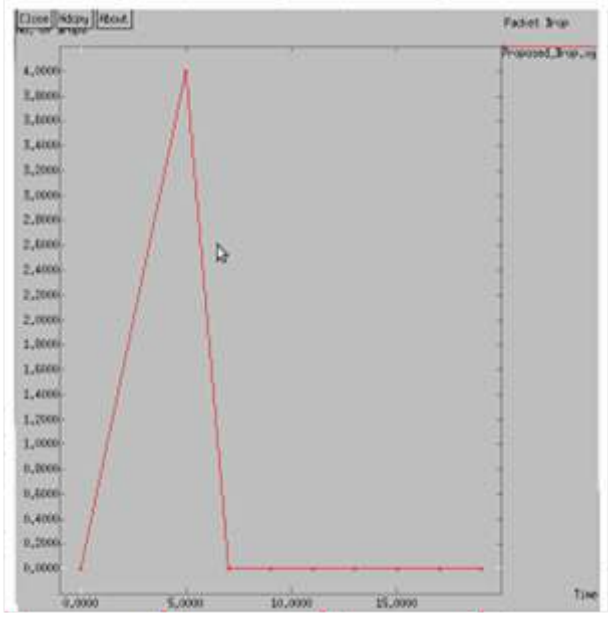
Network Simulator-2.34 version is used for evaluation. In our simulation model, nodes are positioned at random inside a 1800m x 840m physical area. square area is chosen in order to allow nodes to move freely with equal node density.

Parameter	Value
Simulation	NS-2.34
Number of node	21
Environment size	1800*840
Data packet size	1000bytes
Traffic type	CBR
Routing protocol	DSR
Observation parameter	Packet delivery ratio, packet drop, throughput

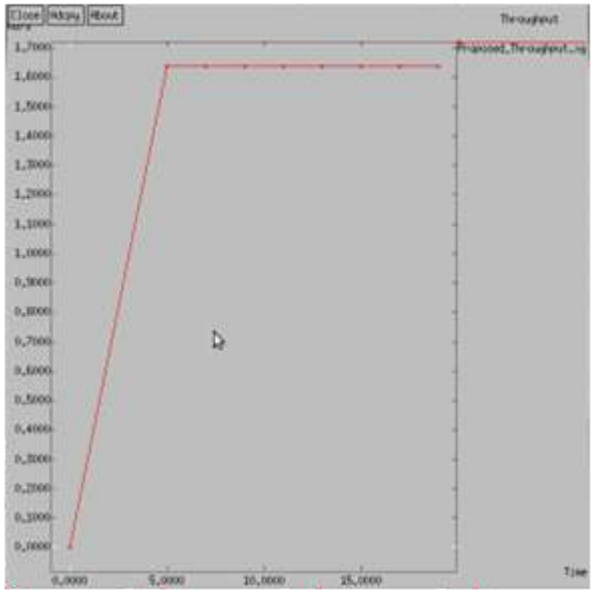
4.RESULTS
Performance analysis



Fig(1). Packet delivery ratio



Fig(2).Packet drop



Fig(3).Throughput

5.CONCLUSION

Thus it can be concluded that the approach existing in this work explain a way to improve the performance of network. The result of this idea gives a good estimation of benefits of neural network using genetic algorithm with back propagation method.

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