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Improving the Stability and Quality of Service in Cluster Head Rule Base System Using MANETs

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Abstract-This paper considers the problem of finding high and low frequency node disjoint and multi constrained QoS multipath from source to destination by using agent based fuzzy inference system. CGSR protocol divide the network into several small areas called clusters and the members of each cluster entrusted to a special node called cluster-head. A fuzzy logic system was proposed by which we select a suitable cluster-head to improve the quality of CGSR protocol. Selecting an appropriate cluster-head can save the power of overall network because the Cluster-Head node consumes more power than other ordinary nodes and the node with the highest chance is elected as the cluster-head.

(1) Determination of multiple paths and picking up of resource information (available energy, mobility,distance,and chance) of the intermediate nodes from source to destination.

(2) Recognition of node disjoint, and multi-constrained QoS fit paths by using Takagi-Sugeno Fuzzy Inference System (TSFIS). TSFIS extracts a fuzzy QoS weight from available resource information of the intermediate nodes.

(3) Selection of the best path depending on the fuzzy QoS weight.

(4) Maintenance of QoS path when path breaks due to mobility of node or link failure.

To test the performance effectiveness of the approach. Simulation results show that our proposed protocol is better than I-MAN on the basis of data drop, load, delay and throughput parameters. Hence, the proposed system gives an efficient result in the presence and absence of threats because it launches an appropriate protocol on the basis of network contexts.

Keywords— Fuzzy Logic System, Hops, QoS, MANET, FIS

I. INTRODUCTION

The QoS requirement of connection includes parameters like bandwidth, end-toend delay, jitter, packet loss rate etc. Multi-constraint QoS parameters are imprecise and uncertain due to dynamic topology of MANETs. However, selecting a route, which satisfies all multiple constraints, is an NP complete problem [4]. There is no accurate mathematical model to describe it. Fuzzy logic is used to provide a feasible tool to solve the multi-metric QoS problem. Fuzzy logic is a theory that not only supports several inputs, but also exploits the pervasive imprecision information [5]. So adopting fuzzy logic to solve multi metric problems in ad hoc networks is an appropriate choice. Multi-constraint based routing protocols use QoS satisfied paths other than the single shortest path to route the packets. If multiple node disjoint paths with multiconstraint QoS paths are set up between a source and a destination, then source node can use these routes as primary and backup routes, i.e., a new route discovery is invoked only when all of the routing paths fail or when there only remains a single path available, whenever node or link fails. This helps to reduce overhead in finding alternative routes and extra delay in packet delivery introduced. Therefore, in this paper we adopt both node disjoint and multi-constraint QoS routing in MANETs.

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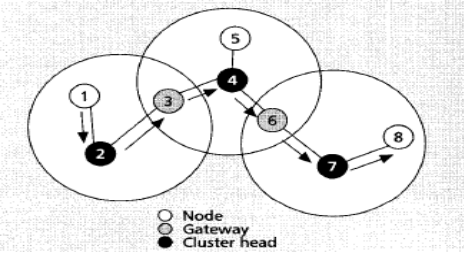


(1) Quality-Means effectiveness can be defined as to retrieve the most relevant set of document for a query. Process text and store text statistics to improve relevance be used.

(2) Speed-Means efficiency may be defined as a process queries from users as fast as possible For it specialized data. The knowledge base consists of a set of rules defined using input and output metrics. The input metrics involve threats, mobility, network size and co-operation level and output metrics involve all the existing solutions and protocols used for secured routing. The behavior monitoring system measures the input metrics and grades the MANET in terms of LOW, MEDIUM and HIGH protection modes to handle diverse MANET contexts. The inference engine decides the best solutions on the basis of rules defined in the rule based system. We have used doctor like diagnostic pattern to identify the perfect behavior of the network. If the network is cooperative then the inference engine chooses the LOW protection mode. Thus, it saves battery power and bandwidth which enhance network cooperation. Choosing a suitable protection mode will certainly enhance network cooperation and maximizes the battery life span. In this work we have taken only three protection modes but it can be extended to satisfy the exact demand.

II. RELATED WORK AND MOTIVATION

Cluster-head gateway switch routing protocol (CGSR) [4] is a traditional hierarchical routing using DSDV as an underlying protocol. In this modal, mobile nodes are partitioned into clusters and a cluster-head is elected using distributed algorithm and a node that is in the communication range of two or more cluster-heads is called a gateway node. All the packets will pass to cluster-heads and then to another cluster-heads or destination, which means that the nodes connect with each other through cluster-heads and gateway nodes. However, the maintenance of the cluster structure is difficult and its performance is largely affected by the cluster-heads and gateways. Based on [4], [5] and [6] both adopt a way used in mobile IP to track the mobility of nodes that the nodes register their current address to nodes acting as home agents. Since a node does not know which cluster a particular destination belongs to, except for those destinations within the same lowest level cluster and all home agents will advertise their (Hierarchy ID) HID's to the top level hierarchy, a source node will prefer to send packets to the home agent of the destination node, then the home agent transfer the packets to destination. Once source and destination have learned each other's hierarchical addresses, packets can be delivered directly without involving the home agent. It solves the problem that when nodes moves away how the route will be set up again. [7] provides a way named Cluster-based Multipath Dynamic Source Routing (CMDSR) to realize multipath transmission of packets, which make sufficient use of the link. Source node S sends a route request message (RREQ) to its cluster head, then the cluster head judge whether the destination node D is in the same cluster as the source node S. If as so, the cluster head informs the source node S to start the routing discovery procedure (using DSR), otherwise, the cluster forwards the RREQ message to the higher server cluster, the server cluster looks for which cluster the destination node D belongs to according to the network topology, then searches for a stable route as a queue directional guideline.

Research works show the limited use of AI techniques to optimize MANET performance. The use of AI technique is presented in I-MAN. It is an Intelligent MANET routing system [3], that deployed already available routing proto-cols to their best advantages. Saeed [4] emphasized on the Intelligent MANET optimization system in his Doctor of Philosophy thesis. I-MAN protocol enforces improvised processes with a lesser no of metrics such as mobility, net-work size that is not efficient for all network contexts and cannot be customized further.

The proposed work is better than the existing solutions [3, 4] because of its object oriented design that can be further customized on the basis of network contexts. Our protocol consumes less energy and enhances network performance because it launches an appropriate protocol on the basis of network contexts. On the other hand existing solutions [1, 3, 4] employ Adhoc services to protect a network thus, consumes more energy and bandwidth and degrade network performance.

III. PROPOSED WORK FOR RULE BASE SYSTEM

Generally, cluster-head election for mobile ad hoc network is based on the distance to the centroid of a cluster, and the closer one is elected as the cluster-head. In past presented a cluster-head election scheme using fuzzy logic system (FLS) for mobile ad hoc wireless networks. The linguistic knowledge of Cluster-Head election was based on parameters and fuzzy rules are set up based on this linguistic knowledge. The outputs were set up based on the linguistic knowledge. The outputs of the fuzzy rules provide a Cluster-Head possibility, and node with the highest possibility is elected as the cluster-head. Other appropriate rules can be created that optimize routing efficiency (e.g., number of hops, QOS, etc).

IV. EXPERIMENT DESIGN METHODOLOGY

Cluster heads are selected and then the clusters ' members are determined. In this phase, each node calculates its energy, chance parameter based there main characteristics through fuzzy logic: its energy, density and centrality in comparison with neighbors. Nodes with higher capability introduce themselves to base station as cluster head' candidate, so they prevent those nodes which are not capable of being cluster head from sending their information. The network uses nodes with different factor after being launched. Nodes that remaining energy in comparison with network's total energy is less than threshold level are recognized as dead nodes and can't participate in competition. In base station, cluster heads are determined among cluster head candidates using genetic algorithm. Also, the number of times in which a node is selected as cluster head is considered.

Then, base station sends a message including cluster head's ID to each node. If a node's cluster head ID conforms to the node's are many rules on the basis of such rule will finalize the cluster group rules such as three or more input parameter and single output parameter.

Table 1 Fuzzy Rule Base

	Energy	Density	Centrality	OUTPUT(chance)
1	low	Low	close	Small
2	low	Low	adeq	Small
3	low	Low	far	Vsmall
4	low	Med	close	Small
5	low	Med	adeq	Small
6	low	Med	far	Small
7	low	High	close	Rsmall
8	low	High	adeq	Small
9	low	High	far	Vsmall
10	med	Low	close	Rlarg
11	med	Low	adeq	Med
12	med	Low	far	Small
13	med	Med	close	Large
14	med	Med	adeq	Med
15	med	Med	far	Rsmall
16	med	High	close	Large
17	med	High	adeq	Rlarge
18	med	High	far	Rsmall
19	high	Low	close	Rlarge
20	high	Low	adeq	Med
21	high	Low	far	Rsmall
22	high	Med	close	Large
23	high	Med	adeq	Rlarge
24	high	Med	far	Med
25	high	High	close	Vlarge

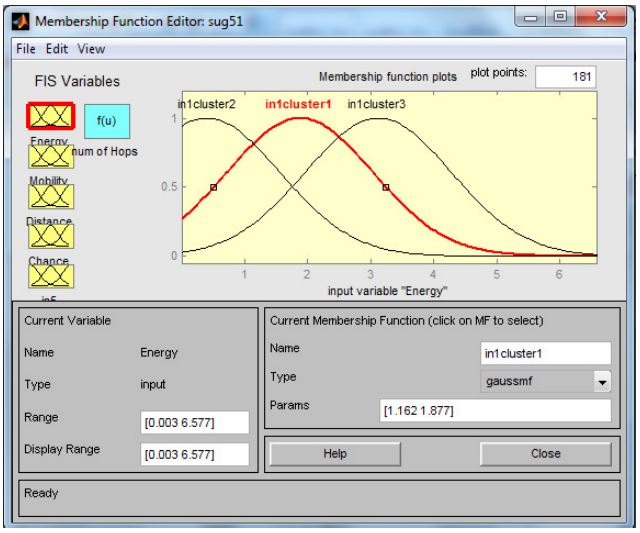
The Fuzzy rules will followed the steps such as:

1. The time of first sensor node's death.
2. The time of whole network's death (the time in which sensor node's energy is finished completely).
3. Three scenarios are used to compare the efficiency of the suggested algorithm. Finally, the proposed algorithm leads to the lightest lifetime in sensor's network.
4. First scenario: In this scenario, the proposed algorithm is evaluated in the form of a heterogeneous network with three different nodes: An advanced node, a normal node and a node which is in a critical condition and has the lowest energy level.
5. Second scenario: In this scenario, the proposed algorithm which is a heterogeneous network with clustering routing is considered in a fuzzy state in which each node determines its capability for being a cluster head based on fuzzy logic.
6. Third scenario: In this scenario, in addition to a network with heterogeneous nodes and fuzzy logic, chaotic based genetic algorithm is proposed to choose the cluster head in base station. In this section, the number of generations is 100, the cross over probability is 0.6 and mutation probability is 0.1.
7. In case any cluster/node is week same case lower energy cluster will occupy the space and push the priority for such nodes.
8. In case cluster group density is low and centrality is close ,rule will generate the Rsmall chance parameter.

V. RESULTS

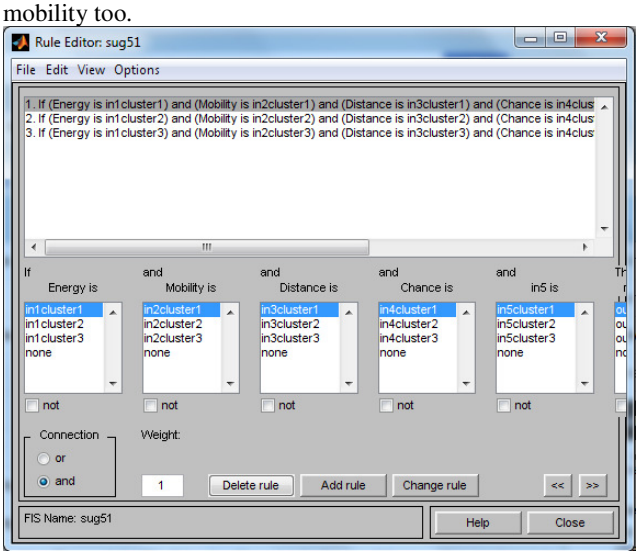
The cluster head sends the data of its sensor nodes to the base station after **compression**. How should I calculate the **energy lost in compression** and how much data (**what factor of original data**) should be transmitted to the base station.

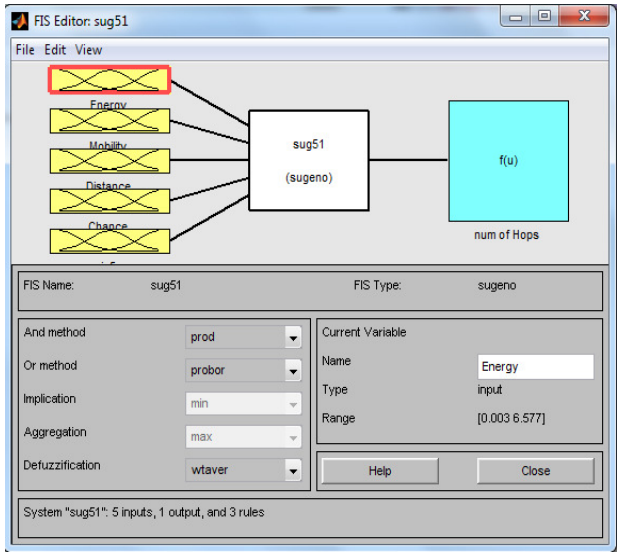
Rule base system will showed the concept the family of the node which is directly proportional to the output parameter.

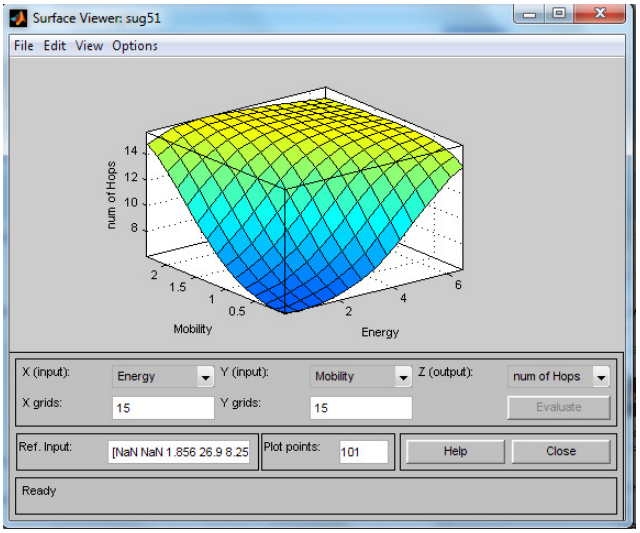


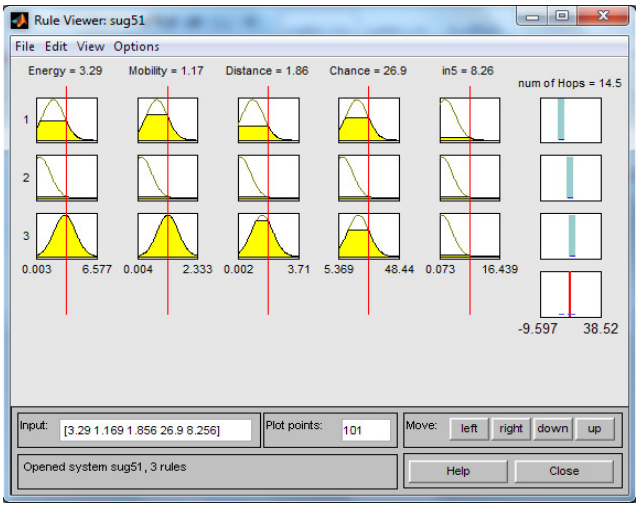
This will generate the overall probability for the cluster group rules with respect to output parameter.

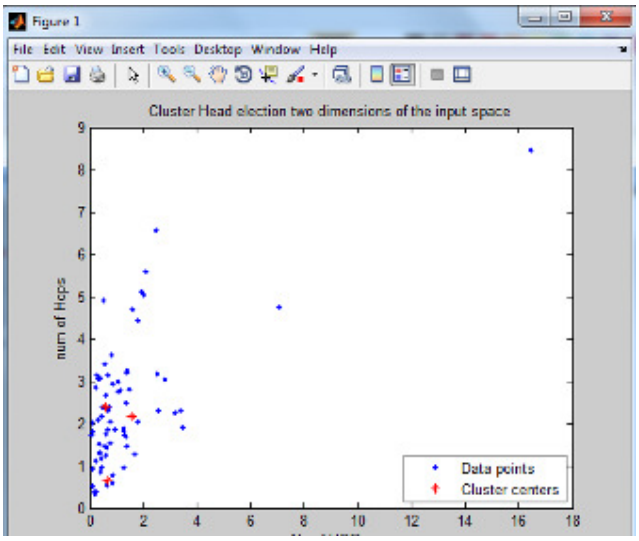
Fuzzy rules will calculate the with respect to the chance and mobility too.











In cluster head election rule base system if increasing the number of HOPs comparivity to the Quality of service it will be in constant level parameter in a specific zone.

VI. Conclusion and Future Scope

In this paper, a new method which is based on fuzzy logic and genetic algorithm is represented to choose a cluster head if cluster head get fail ,should be priority for second lower parameter rule base concept. Moreover, this network has used nodes with multipath characteristics. Some of the advantageous of heterogeneous nodes are: the long lifetime of networks, increase in network's stability and decrease in data transference Quality of impowerment. In simulation, the suggested algorithm is compared to LEACH For the study of future android platform should be include the base station for the sensor node.

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