University of Technology
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Thesis Title	MANET Clustering Based on Hybrid Fuzzy-Genetic System
Research Field	Soft Computing and Networks
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Abstract

The demand for self organizing, self healing networks without the interference of centralized or pre-established infrastructure/authority has been adopted to follow the increase in usage of wireless networks. Furthermore, in Mobile Ad hoc Network (MANET) cluster head selection is considered an important challenge especially in dynamic topology. Using soft computing techniques have shown a remarkable enhancement on network management.

In this research an efficient intelligent cluster head selection algorithm has been proposed. Selection of the cluster head efficiently was bases on three important affecting factors; energy, mobility, and distance. Hybrid (Fuzzy-Genetic) intelligent controller has been used to optimize the cluster heads selection in the network. The proposed algorithm has been evaluated through simulation in MATLAB (R2012a). The results have been obtained according to specific assumptions. For further evaluation, the ordinary Ad hoc On-demand Distance Vector (AODV) routing protocol have been compared with the modified (Cluster-Based) AODV protocol.

The proposed intelligent Cluster Head (CH) election system is reliable and shows high limit of average energies *0.7847-1.381* Watt, lower limit of average mobility *0.3863 - 6.7011* m/sec, and lower limit of average distances between CHs *200-400*m.

In addition the modified AODV protocol is more scalable than the classical AODV because it showed an improvement in throughput, packet loss ratio, and number of hops

when increasing the number of nodes in the network. Where the throughput is better in all number of clusters especially when number of cluster (3, 4, and 5), the gain is (*30.59%*, *31.10%*, and *28.279%*) respectively.

And the packet loss ratio is better especially when number of cluster (3, 4, 5, and 6), the gain is (*6.01%*, *5.995%*, *5.995%*, and *5.968%*) respectively. But the gain is ends when the number of cluster increased over 10 clusters (the cases of 11 and 12).

Finally the number of hops is better in all number of clusters especially when number of cluster (10), the gain is *31%*.

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