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Literature Survey on Particle Swarm Optimization in Clustering Algorithm

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***Abstract*- In this paper author discussed about the previous researches of Particle Swarm Optimization based Clustering Algorithm in MANET. PSO initialized with a group of random particles and then searches for optima by updating generations. The individual nodes divided into groups running in four neighborhood nodes simultaneously, extending the algorithm in a distributed computing manner. In our study Particle Swarm Optimization, based Clustering approach is efficient and effective, especially when the distribution of mobile nodes is dense.**

Keywords: - PSO, Simulated Annealing, Clustering Algorithm, MANET, NS-2

I. INTRODUCTION

Ad-Hoc is a Latin word, which means for this", meaning for this special purpose only", by expansion it is a special network for a particular application. A mobile ad-hoc network is collections of mobile Nodes, which have communicate over radio range. These networks have an important advantage; they do not require any pre existing infrastructure or central administration. Therefore, mobile ad-hoc networks are suitable for temporary communication links. This flexibility however, comes at a price: communication is difficult to organize due to frequent topology changes.

Particle Swarm Optimization (PSO) (Kennedy and Eberhart, 1995), which is a population-based global search method, is known to suffer from premature convergence prior to discovering the true global minimizes. In this thesis, a novel memory-based method is proposed which aims to guide the particles through the information deduced from the external memory contents rather than to re-inject them into the population.

This is done by calculate a coefficient, based on the distance of the current particle to the closest best and closest worst particles in the external memory at each iteration. Later, when updating the velocity component, this coefficient added to the current velocity of the particle with a certain probability. Also, randomized upper bound and lower bound values have been defined for the inertia component. The algorithm starts with the upper bound value of the inertia. At each particle evaluation the inertia is decreased non-linearly with a small value and when its value reaches the lower bound, the inertia value is reset to its upper bound.

The particle swarm algorithm is a computational method to optimize a problem iteratively. As the neighborhood determines the sufficiency and frequency of information flow, the static and dynamic neighborhoods are discussed. With velocity each particle moves with in the search space and dynamically adjusts its velocity, according to its previous behaviors. Therefore, particles tend to move towards better points within the search space. Since the method is easy to implement and has various application areas, neighborhood topologies used in the particle swarm optimization, parameter adjustment of this algorithms, hybrid particle swarm optimization algorithms, stability analysis of the particle swarm optimization, and applications of PSO method.

II. LITERATURE REVIEW

The particle swarm algorithm is a computational method to optimize a problem iteratively. As the neighborhood determines the sufficiency and frequency of information flow, the static and dynamic neighborhoods are discussed. With velocity each particle moves with in the search space and dynamically adjusts its velocity, according to its previous behaviors. Therefore, particles tend to move towards better points within the search space. Since the method is easy to implement and has various application areas, neighborhood topologies used in the particle swarm optimization, parameter adjustment of particle swarm optimization algorithms, hybrid particle swarm optimization algorithms, stability analysis of the particle swarm optimization, and applications of particle swarm optimization method.

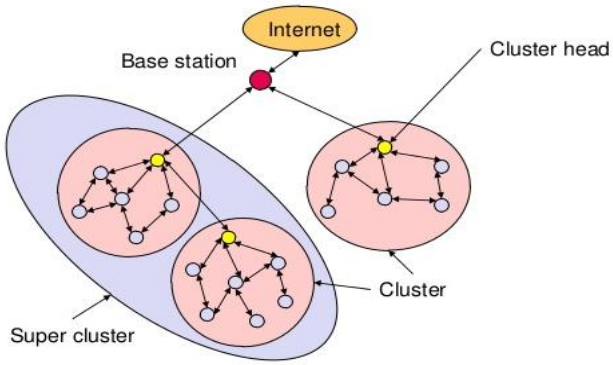

Figure 1: advert hoc network clustering

III. CLUSTERING TECHNIQUES

In this piece, several ad hoc network-clustering approaches debated in detail with their appropriate domain of taxonomy Connectivity based clustering, This form of clustering methods the connectivity amid nodes are the essential property for CH arrangement. The

appropriate methods of such technique are discussed in this part.

(i) K-hop connectivity ID clustering algorithm (K-CONID)

It merges 2 clustering algorithms that are highest-measure and Lowest- identification heuristics. At the beginning, node being a flooding procedure in which a clustering demands transferred to every node. If using merely a lower ID clusters generated afterwards more clusters than necessity is generated. Therefore result is a set of cluster-heads increases. Conversely using only node connectivity causes numerous of evaluation between nodes. Consequently, by combining both can limit on number of clusters. The node having absolute best connectivity is chosen as the cluster-head, when quantity of hops k=1, connectivity is equal to node degree. K-CONID generalizes connectivity for a k-hop near-hood and if degree of connectivity of the two nodes is similar then priority node elected with lowest id.

(ii) Adaptive cluster load balance method

In HCC clustering design, one cluster head can be consumed and exhausted whenever it serves too many mobile host and CH becomes a bottleneck. So a fresh method is given in according to which f a source node is a CH, it will usual the number of its dominated member nodes as "Option" value n hello message format, there is an "Option" is obtainable in hello message format. When the sender node is not a cluster head or it is ambivalent, "Option" will be reset to 0. When Hello message of a CH displays which it's dominated nodes' number increase a threshold, no latest node will participate in this cluster. Therefore, resource consumption and information transmission is distributed to all clusters rather than few clusters.

(iii) MOBILITY –AWARE CLUSTRING

Mobility Based Metric for Clustering (MOBIC):

It recommends the partition of an ad hoc network in d-hop clusters depend at mobility metric. The clusters are formed in such a method mobility nodes with little speed relative to their near become CH. The aggregate mobility metric is calculated over a little time by calculating the difference of relative mobility amongst a node and all its neighbors. The only distinction between Lowest-ID and MOBIC is that it utilizes mobility metric for cluster formation rather than for ID information. Firstly, the pair wise relative mobility metrics is calculated and then aggregate relative mobility metric is computed before transmits the next packet.

(iv) COMBINED WEIGHT BASD CLUSTRING

Weighted clustering algorithm (WCA): The WCA is grounded on utilizes of a merged weight metric. For election of cluster-head the metrics used are the number of neighbors, distance with every neighbors, mobility plus cumulative time for which the node operates as the CH. The downside of WCA is, if a node moves in an area which is not supervised by any cluster-head then the cluster set-up procedure is evoked again which triggers re-affiliations. A Hello message involves its position and ID. Every node builds its nearest list that is depending on the Hello messages accepted. Each node figures its weight value by algorithm stated below

An Efficient Weighted Distributed Clustering (CBMD): It take advantage of varied weight function which takes into consideration the parameters: residual battery energy (B), connectivity (C), usual mobility (M), and distance (D) of the nodes to choose locally top-quality CH. Benefits of these clustering algorithms are that load balancing between the clusters is achieved and less number of clusters formed by specifying the maximum and smallest number of nodes which a CH can ideally control. Additionally, all mobile node starts to measure its weight after n (small integer in order to minimize the memory requirement) consecutive HELLO messages, where the result spells out the precise value for the mobility and battery power. This algorithm is brought into play to choose optimal cluster-heads and divide optimal number of clusters without degrading the whole network performance, to meet with the load balancing between clusters, to maximize the cluster stability and to lessen the communication overhead and minimizing the overt control messages caused by cluster maintenance

A Distributed Weighted Clustering Algorithm:

It works similar to WCA apart from that power management and distributed cluster set up is done by localizing configuration and reconfiguration of clusters. The expended battery power is a better influence equated to the cumulative time during that the node works like a CH which is utilized in WCA as it reflects the concrete amount of power usage. Two situations can enable the cluster maintenance phase, first is when there is node movement outside of its cluster boundary and second is when there is excessive battery consumption at the CH. In the former case, it is necessary to search a fresh CH to affiliate with. If it search a novel CH, it hands over to the novel one cluster. If doesn't, it declares itself as a CH. If the extent of consumed battery power becomes more than a threshold value then the cluster-head resigns and becomes an ordinary node. This algorithm offers superior performance than WCA in jargon of the number of re-affiliations, end-to-end throughput, overheads throughout the primary clustering Set up section, with the lifespan of nodes.

IV. PROBLEM DOMAIN

Mobile ad-hoc network is one of growing field of research where lots of work done, in our paper, which is based on simulated annealing, has following issues:

- Repeatedly annealing with a 1/log k schedule is very slow, especially if the cost function is expensive to compute.
- For problems where the energy landscape is smooth, or there are few local minima, SA is overkill --- simpler, faster methods (e.g., gradient descent) will work better. But generally don't

know what the energy landscape is for a particular problem.

- Heuristic methods, which are problem-specific or take advantage of extra information about the system, will often be better than general methods, although SA is often comparable to heuristics
- The method cannot tell whether it has found an optimal solution. Some other complimentary method (e.g. branch and bound) is required to do this.

V. CONCLUSION

MANET is a dynamic transportation of statement. In this network the mobility and dynamic network topology is an essential property of network. These properties are making it adoptable for different complex applications. In this paper, the ad hoc networks performance, scalability, and cluster based previous approaches studied and discussed. Finally, author analyzes that clustering head selection algorithm much better for wireless ad hoc networks.

VI. FUTURE WORK

Author suggest for design a Particle Swarm Optimization with cluster head selection Algorithm, because such a cluster head techniques handles the maximum possible number of mobile nodes in its cluster in order to facilitate the optimal operation of MAC the protocol, so author suggest this for Future work.

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