A Survey on Dynamic data Collection by Fuzzy logic in WSN

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Abstract-

The most challenging aspect of WSN is that they are energy resource-constrained and that energy cannot be replenished. Clustering methods in WSN lead the sensor nodes to be organized into small disjoint groups, where each cluster has a coordinator referred as cluster head (CH). Maintaining the clusters is a challenging task. To choose CH as a node, it is necessary to define its eligibility. That is calculated based on local information of the nodes' current situations such as its residual energy. The eligibility of the selected CHs reduces as the sensor nodes are consuming energy for transferring data. However, there is possibility that the CHs may fail to function incorrectly due to various reasons such as power instability. During the failure, the CHs are unable to collect and transfer data correctly. This affects the performance of the WSN. Early detection of failure will reduce the data loss and provide possible minimal recovery efforts. This paper proposes a self-configurable clustering mechanism to detect the disordered CHs and replace them with other nodes.

Keywords: Residual Energy, Node Centrality, Local Distance, Cluster Heads.

I. INTRODUCTION

WIRELESS Sensor Network considered as real time embedded system deployed in a particular region to sense various types of environmental parameters such as temperature, pressure, gas, humidity etc. The huge applications of WSN like habitant monitoring, forest fire0 detection, surveillances, transport monitoring etc. have created a lot of interest among the researcher community in recent past. Typically, WSNs are densely deployed in hazardous places where battery recharge or replacement is nearly impossible and human monitoring scheme is highly risky. There are many typical issues such as power constraints, limited computing capacity, open environment; radio connectivity makes the sensor nodes faulty many times. Once the network is established, nodes keep on sensing the information and the battery power goes exponentially. Whenever the nodes detect any event, they send the information to the other nodes or to the base station. Sometimes it happens that the same information received by nearby sensor nodes can be received by the base station that makes the network inefficient0. To avoid this data redundancy and to make the network most energy efficient0, data aggregation and sensor fusion have been emphasized in the literature [1]. Many routing protocols with many different ideas have been proposed in the literature to make the network energy efficient0 [14].

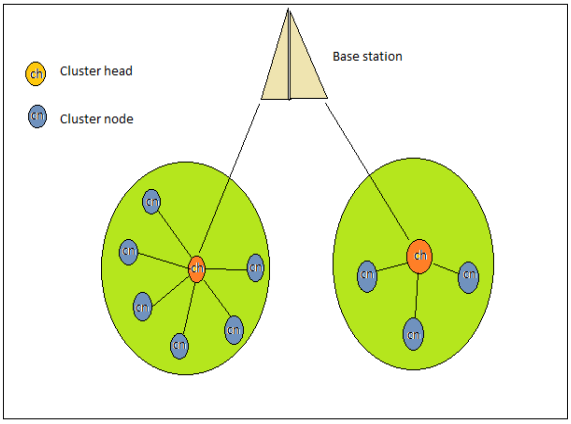

Fig.1 Representation of Cluster Members and Cluster Heads

Cluster based routing protocol is one of these efficient ideas, where sensor nodes are divided into number of groups and each group is called as a cluster. In each cluster one group leader is elected known as Cluster Head (CH). Data aggregation is obtained at the leader node. The leader node/CH is only responsible for sending the message to the BS. Figure 1 shows the general system model for clustering based WSN. LEACH [1], [2] is the first1 famous hierarchical routing protocol which is proven to be most efficient over traditional routing protocol. In LEACH, the CH is elected in a

probabilistic manner and tries to balance the load at each sensor node in a rotation basis. Even though many studies present the efficiency of LEACH protocol, it has certain pitfalls that need to be discussed. As LEACH relies on probabilistic value, it might happen that, in each round either more than one cluster heads are elected or no cluster head is elected. Further the cluster head(CH) may be elected at the boundary of the network which leads to the improper energy distribution. LEACH also does not consider the distribution of sensor nodes and remaining energy of each node after completion of each round. LEACH-C is another routing protocol [2] follows a centralized approach to elect the CH by using BS and location information of each sensor node. By doing so, it produces better number of clusters and distributes the CHs evenly among the clusters. At the same time it increases the network overhead since all the sensor nodes are required to send their location information to BS at a time in every set-up phase. In the proposed model, attempt has been made to improve the performance of LEACH protocol in view of electing an appropriate Super Cluster Head (SCH) among the CHs by applying suitable fuzzy descriptors. Only SCH is allowed to send the message to the BS by reducing the number of message retransmissions performed by the CHs. The following sections discuss the protocol in detail. The rest of the paper is organized as follows. Section II presents an overview of the related work in this area. Section III discuses about the Radio Model. Section IV presents the Fuzzy Inference Modules and the proposed algorithm. Results and discussions are provided in Section V. Section VI indicates the future research followed by the conclusive remark. The cluster illustrating structure is shown as below.

II. SURVEYED DESIGNS

Akhtar et al. has presented ―Energy Aware Intra Cluster Routing for Wireless sensor networks, in 2010. In this research work, authors proposed a new technique for intra cluster routing which is more energy efficient than a well known routing protocol Multihop Router that performs multihop routing. They proved their idea by simulating a network of 30 nodes in TOSSIM. Parameters are considered while justifying the idea through the results of simulation, they are: number of packets sent , energy consumed , remaining energy level of nodes at specific time and network lifetime. By using proposed technique shows that they had increased the network lifetime and number of packet sent.

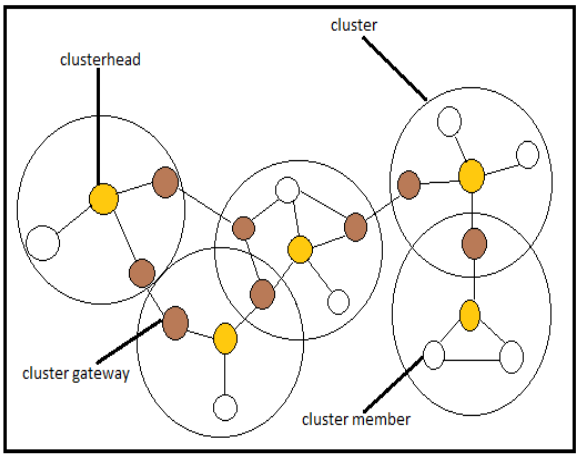

Fig:2 Cluster Structure Illustration

Zijian Wang et al. has presented ―Energy Efficient Collision Aware Multipath Routing for Wireless sensor networks, in 2009. They proposed an energy efficient and collision aware (EECA) node-disjoint multipath routing algorithm. The main idea of EECA is to use the broadcast nature of wireless communication to avoid collision of two routes without an overhead. Additionally,(EECA) discovers the flooding route and restrics it, and also adjusts node transmit power with node position information ,which results in energy efficiency and for the good performance. They used NS-2.33 simulator to evaluate the proposed scheme in terms of the packet delivery ratio, end-to-end delay, residual energy and the number of nodes alive. Their preliminary simulation shows the results of ECCA algorithm, which results in good performance, transferring data and efficiently saving energy.

Ming Liu et al. has presented ―An Energy-Aware Routing Protocol in Wireless sensor networks, in 2009.The authors present EAP a energy efficient data gathering protocol. Energy-Aware Routing Protocal(EAP) clusters sensor nodes form groups and among cluster headsbuilds routing tree for energy saving communication. In addition, it introduces the idea of area coverage to reduce the number of working nodes within cluster, in order to prolong the network lifetime. Though EAP results of stimulation shows the outperforms of LEACH, that performs almost same as HEED when the density of node is low, it has far better performance than

HEED when node density goes higher than 0.01nodes/m2.

Lu Su et al. has presented ―Routing in Intermittently Connected sensor networks, in 2009. Identify the challenges of routing in intermittently connected sensor networks and proposed an on demand minimum latency routing algorithm(ODML) to find minimum latency (ODML) to find minimum latency routes. They proposed two proactive minimum latency routing algorithms: optimal PML and quick―PML. The schemes proposed in this paper can provide generic routing functionalities for most of the existing scheduling schemes.

K. Akkaya et al. has presented ―A survey on routing protocols for wireless sensor networks, in 2005.This paper surveys recent routing protocols for sensor networks and presents a classification for the various approaches. The categories explored in this paper are data-centric, hierarchical and location-based. Each routing protocol is described and discussed under the appropriate category. Moreover, network flow and quality of service modeling are also discussed used for contemporary methodologies protocols. The paper concludes with open research issues.

Basil Etefia et al. has presented ―Routing Protocols for Wireless sensor networks, in Berkeley–Information Technology (SUPERB–IT) 2004. They presented an improvement on the implementation of information routing capabilities in ad hoc wireless sensor networks. Network's localization and power conservation abilities can increases byimproving the protocols used by each sensor node. Using novel and creative schemes to generate shortest paths for information routing from source to destination nodes, they had been implemented an approach to limit the inefficiencies of routing protocols used by sensor networks for information transfer.

A.P.Subramanian et al. has presented ―Multipath Power Sensitive Routing Protocol for Mobile Ad hoc Networks in 2004.The Multipath Power Sensitive Routing (MPSR) Protocol for Mobile Ad hoc Networks has been presented. Providing multiple paths is useful at ad hoc networks as when one of the routes is disconnected, the source can simply use other available routes without performing the route discovery process again. The simulation was done using the Global Mobile Simulator glomosim0 Library. The results of extensive simulation show that the performance of MPSR protocol is on an increasing trend as mobility increases when compared to the Dynamic Source Routing and using this protocol is that the end-to-end packet delay does not increase significantly.

Charles E.Perkins et al. has presented ―Ad-hoc On- Demand Distance Vector Routing in 2003.They have presented a distance vector algorithm that is suitable for use with ad-hoc networks AODV avoids problems. Their new routing algorithm is suitable for a dynamical self-starting network as required by users wishing to utilize ad-hoc networks. Ad-hoc On- Demand Distance Vector Routing(AODV) provides loop-free routes even while repairing broken links. As the successor to Maisie they have simulated AODV using an event-driven packet level simulator called PARSEC which was developed at UCLA , it shows the algorithm scales for mobile nodes of large populations wishing to form ad-hoc networks. They also include an evaluation and simulation results to verify the operation of their algorithm.

Fan Ye et al. has presented ―A Two-Tier Data Dissemination Model for Large-scale Wireless sensor networks, in 2002.They described TTDD, a two-tier data dissemination design, to enable efficient data dissemination in large-scale wireless sensor networks with sink mobility. Instead of passively waiting for queries from sinks, TTDD exploits the property of sensor being stationary and location-aware to let each data source build and maintain a grid structure in an efficient way. Queries are forwarded upstream to data sources along specific grid branches, pulling sensing data downstream toward each sink. They implement the TTDD protocol in ns-2 and used the basic greedy geographical forwarding with local flooding to bypass dead ends. Their analysis and extensive simulations have confirmed the effectiveness and efficiency of the proposed design, demonstrating the feasibility and benefits of building an infrastructure in stationary sensor networks.

Maurice Chu et al. has presented ―Scalable Information-Driven sensor Querying and Routing for ad hoc Heterogeneous sensor networks, in 2002.They describes two novel techniques, Information-Driven Sensor Querying (IDSQ) and Constrained Anisotropic Diffusion Routing (CADR), for energy-efficient data querying and routing in ad hoc sensor networks for a range of collaborative tasks ie: signal processing. The key idea is to introduce an information utility measure to select which sensor to query and to dynamically guide data routing. There simulation results have demonstrated

that the information-driven querying and routing techniques are more energy efficient, have lower detection latency, and provide anytime algorithms to mitigate risks of link/node failures.

III. CONCLUSION

We have completed the dynamical study on fuzzy logic control management which has been proposed for WSN and also surveyed on energy management system to develop the high energy life time management system for WSN. In future energy management system can be easier by using fuzzy logic control.

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