A Literature Survey on optimizing network connectivity and target coverage in Mobile sensor network via hierarchical clustering

[1]Miss.Nishigandha Thakare, [2]Prof. S D Zade

[1]M.Tech Scholar, [2]Professor
PIET, Nagpur

***Abstract*: Coverage of interest point and network connectivity are consider to be the two most important aspects in mobile sensor network. This paper focuses on the challenges of the Mobile Sensor Deployment (MSD) problem and investigates how to deploy mobile sensors with minimum movement and energy consumption to form a WSN that provides both target coverage and network connectivity A hierarchical clustering based technique for coverage and connectivity improvement which will classify the input network coverage and connectivity into multiple classes like uncovered, covered, overlapped so that the regions are properly identified and node placement is done accordingly with higher efficiency.**

Index terms: Wireless Sensor Network (WSN); Target Coverage (TCOV); Network Connectivity (NCON); Mobile Sensor Networks (MSNs); Mobile Sensor Deployment (MSD).

1. Introduction:

Wireless sensor networks (WSN) have inspired tremendous research interest in recent years. Wireless Sensor Network is an arrangement of autonomous and well disturbed which may or may not have an additional facility of mobility. A typical large-scale WSN consists of thousands of sensor nodes deployed either randomly or according to some predefined statistical distribution over a geographical region of interest. The nodes are deployed and relocated on their own due to the mobility of sensors. Sensor's sensing range affects the Target Coverage whereas Sensor's communication range decides the Network Connectivity. Target Coverage and Network Connectivity both affects the performance and quality of the Network. In this paper, we address a practically important problem of minimizing sensor's movement to get both Target Coverage & Network Connectivity in Mobile Sensor Networks and also low energy consumption.

2. Literature Survey:

In the existing research the researchers have used a Hungarian method based on Steiner minimum tree which uses Voronoi clustering for coverage and connectivity improvement[1]. Here they first formulate the Mobile Sensor Deployment (MSD) problem with the aim of deploying mobile sensors to provide target coverage and network connectivity with minimum movement. The MSD problem is then decomposed into two sub-problems: Target COVerage (TCOV) and Network CONectivity (NCON). Combining the solution to the two sub problems is the solution to the MSD problem. An exact algorithm based on the extended Hungarian method is used to find the optimal solution to the TCOV. The Basic algorithm based on clique partition, and the TV Greedy algorithm based on Voronoi partition diagram are two heuristic algorithms are also used. The Basic algorithm reduces the total movement distance by minimizing the the number of sensors to be moved. The TV Greedy algorithm minimizes the total movemet distance by grouping and dispatching sensors according to their proximity to targets in the voronoi diagram. Constrained Steiner tree is used to find the optimal sensors for the NCON problem. The results demonstrate that the combination of the solutions to TOCV and NCON offers solution to the original MSD problem. In the existing research to increase coverage in a mobile sensor network the Maxmin-vertex and Maxmin-edge algorithms tend to maximize the minimum distance of every sensor from the vertices and edges, respectively, of its Voronoi polygon are also used [2]. The issue of Target Coverage (TCOV) and Network Connectivity (NCON) in Mobile Sensor Networks (MSNs) are taken into consideration. To solve TCOV problem, two algorithms are proposed: Basic algorithm and TV Greedy algorithm. TV Greedy algorithm achieves less movement than basic algorithm because it selects the sensor which is very close to target to achieve that target. Hence, the proposed scheme overcomes the issue of TCOV & NCON in MSNs & increase the network lifetime [4].

3. Disadvantages of existing system

1] Approach is computationally complex

2] Does not identified overlapping areas which reduces the system efficiency

3] More energy required for movement of sensor

Table 1: Performance metrics of different combination of algorithms

Algorithm Combination	Coverage/Steiner sensors	TCON/NCON movement(m)	Total sensors/movement(m)
Ex-Hungarian+ECST	20/62	264.1/531.6	82/795
Basic+ECST	16/47	225.8/629.2	63/855
TVGreedy+ECST	18/82	94.3/325.7	100/420

4. Flowchart of the System:

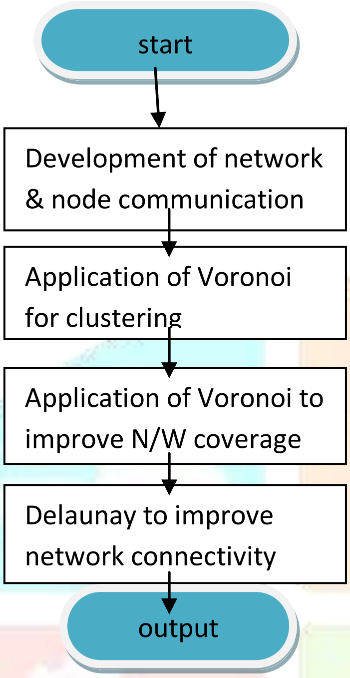

Fig. System architecture.

Advantages of Proposed system:

1. System efficiency improved as overlapping areas are covered.
2. Computationally less complex.
3. As movement of sensors is minimized energy consumption is also less
4. As movement of sensors is minimized energy consumption is also less

Hierarchical Clustering and Delaunay Triangulation:

The hierarchical clustering is an efficient way to reduce the overall energy consumption within the cluster by performing aggregation and fusion of data. Hence, the amount of transmitting information to the base station is decreased. Clusters create hierarchical Wireless Sensor Networks (WSNs) which facilitate efficient utilization of limited resources of sensor nodes and thus extend network lifetime, reduce energy consumption of the system and provide overall system scalability. Delaunay triangulation graph is a planar graph that contains all the Delaunay edges shorter than a threshold, and can be constructed and used efficiently by local communication.

Conclusion

In this we used Hierarchical clustering based technique Delaunay triangulation for coverage and connectivity improvement so we can done node placement with higher efficiency and also power consumption by sensor is also minimized.

References

[1] Zhuofan Liao, Jianxin Wang, Shigeng Zhang, Jiannong Cao and Geyong Min, “Minimizing Movement for Target Coverage and Network Connectivity in Mobile Sensor Networks”, IEEE Transactions On Parallel And Distributed Systems, Vol. 26, No. 7, July 2015

[2] Hamid Mahboubi, Kaveh Moezzi, Amir G. Aghdam, Kamran Sayra, and Vladimir Marbukh, “Distributed Deployment Algorithms for Improved Coverage in a Network of Wireless Mobile Sensors” IEEE transactions on industrial informatics, vol. 10, no. 1, February 2014.

[3] Arnab Raha, Shovan Maity, Mrinal Kanti Naskar, Omar Alfandi and Dieter Hogrefe, “An Optimal Sensor Deployment Scheme to Ensure Multi Level Coverage and Connectivity in Wireless Sensor Networks,” 2012 IEEE.

[4] D.Prasad, “Enhancing Target Coverage and Network Connectivity of Mobile Sensor Networks”, International Journal of Innovative Research in Computer and Communication Engineering (IJIRCCE), Vol.4, Issue 1, January 2016.

[5] Sonali Karegaonkar and Archana Raut, “Improving Target Coverage and Network Connectivity of Mobile Sensor Networks”, International Journal of Science and Research (IJSR), Vol.4, Issue No. 4, April 2015.

[6] I. F. Akyildiz, T. Melodia, and K. R. Chowdury, “Wireless multimedia sensor network: A survey,” IEEE Wireless Commun., vol. 14, no. 6, pp. 32–39, Dec. 2007.

[7] M.CardeiandD. Z. Zhang, “Improving wireless sensor network lifetime through power aware organization,” Wireless Networks, vol. 11, no. 3, pp. 333–340, 2005.

[8] Ajit Singh Negi, Neha Garg, Akhand Pratap Singh, “Role of Clustering in Achieving Energy Efficient Coverage in Wireless Sensor Network: A Short Review,” International Research Journal of Engineering and Technology (IRJET), Volume: 02 Issue: 02, May-2015.

[9] G. Wang, G. Cao, T. LaPorta, Movement-assisted sensor deployment, in: Proceedings of IEEE Infocom, INFOCOM’04, Hong Kong, China, March 2004, pp. 80–91.

[10] Ali Chamam and Samuel Pierre, “On the Planning of Wireless Sensor Networks: Energy-Efficient Clustering under the Joint Routing and Coverage Constraint”, IEEE transactions on mobile computing, vol. 8, no. 8, August 2009

[11] M. B. Haider and K. Sugihara, An Energy Efficient Routing Approach for Wireless Sensor Networks, *Proceedings of 9th International Conference on Computing CORE*, Mexico City, Mexico, 2008, pp. 261-276.

Biography

Miss Nishigandha A. Thakare is a M.Tech Student in the Department of Computer Science & Engineering, Priyadarshini Institute of Engineering and Technology, Rashtrasant Tukadoji Maharaj Nagpur Uni versity, Nagpur.