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A Survey on Redundant Node Selection Approaches in WSN

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ABSTRACT

Coverage and connectivity are the two most important issues in wireless sensor network, one can improve it by eliminating redundant notes , eliminating the redundant nodes reduce computation and get high degree of coverage with connectivity with minimum number of active nodes is extremely challenging. Coverage and connectivity of the network provide high quality of service to the network it shows that how the area is covered and how accurate the information is gathered by the nodes. Maximizing the network coverage and maintaining the connectivity among the nodes in the network is a main problem. This survey includes several algorithms and techniques that address's coverage connectivity issue.

Keywords: Wireless Sensor Network , Coverage , Connectivity , Sleep Scheduling, Redundant Node, Active Node, Region of Interest

I. INTRODUCTION

The WSN comprise of self-governing sensors that are spatially joined. The fundamental errand of remote sensor system (WSN) is to distinguish, gather and report the components of the physical world. Every hub in the system is fit for preparing, social occasion, and speaking tactile data with different nodes in the system. WSN have wide mixture of use in the field of military territory, war zone, medicinal finding, and natural checking. The achievement of the WSN relies on upon the position of the sensor hub. The sensor nodes are battery controlled when one hub is out of battery that will influence the whole system. Execution of the system is one of the key elements of WSN so as to accomplish superior of the system the rest planning methodology is utilized. In rest planning approach a portion of the nodes are rest discontinuously in the event that they have no work to do that will builds the battery life time . alongside that the expulsion of repetitive nodes from the system will diminishes the crash between the information's that additionally lessen the use of force so that the life time of the battery is moved forward.

For the progressive operation of the WSN system scope and network is obliged. Scope implies the amount of territory it can secure and the integration demonstrates that how viably it sends information from the source hub to the sink. Scope issue is brought on by three principle reasons:

Insufficient sensors to cover the entire Region of Interest (ROI), constrained detecting extent and arbitrary arrangement. Relied on upon the scope destinations and applications, they can be essentially ordered into three classes' region scope, point scope and way scope. Hub which contains repetitive data is called excess nodes and alternate nodes are called dynamic nodes. By taking out the repetitive nodes and utilization least number of dynamic nodes to accomplish the scope, integration and higher execution is the real point of this work.

II. METHODS AND MATERIAL

2. Key Concepts

2.1 Coverage

Overall system performance is affected by the coverage so we need to use a measure of coverage historically, coverage of three type have been defined

Blanket Coverage - The main objective of the sensor network in area coverage is to cover (monitor) a region (the collection of all space points within the sensor field), and each point of the region need to be monitored. To achieve a static arrangement of nodes that maximizes the detection rate of targets appearing in the sensing field

Barrier Coverage - Barrier coverage refers to the detection of movement across a barrier of sensors. This is useful in applications where the major goal is to detect intruders as they cross a border or as they penetrate to a protected area. To achieve a static arrangement of nodes that minimizes the probability of undetected intrusion through the barrier

Sweep Coverage - The problem of sweep coverage comes from applications that do not require continuous sensor coverage while the system cost for full coverage is prohibitive. The main goal is to cover the targets in the area within a given time interval. In most cases, mobile nodes are introduced for sweep coverage to move a number of nodes across a sensing field, such that it addresses a specified balance between detection rates. Rate of events and minimizing the number of missed detections per unit area.

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2.2 Connectivity

It shows how the data is to be transmitted from the data source to the data sink.

2.3 Redundant node

A node is said to be redundant if all the data present inside that node is present in some other nodes also. The removal of redundant node from the network is very important and it reduces the energy consumption by avoiding collisions inside the network.

2.4 Network life time

It shows how long a network can work in normal stage. Longer network lifetime is needed for good performance.

2.5 Computational Complexity

The summation of time complexity and the space complexity of a network shows the computational complexity of that network.

3. Overview

In this section we giving brief outline of different algorithms to achieve coverage and connectivity of the WSNs. Table 3.1shows the comparison between them.

3.1 Artificial Bee Colony Algorithm for Dynamic Deployment of Wireless Sensor Networks

Celaozturk et al.,[1] proposed Artificial Bee Colony Algorithm for Dynamic Deployment of Wireless Sensor Networks. The major issue of wireless sensor network is dynamic deployment and it directly affects the performance of the system. The artificial bee colony (ABC) algorithm achieves high performance by increasing the coverage area of the network and is developed by taking forging behaviour of honeybee swarms as model. The position of the food source and the amount of nectar in that food corresponds to the solution to the optimization problem and the quality of the associated solution respectively. The food source refers to the deployment of sensors in the sensed area. Total coverage area is showed by the fitness value of the solution. ABC algorithm is an appropriate way to achieve Good coverage.

3.2 Energy Efficient Ant Colony Algorithms for Data Aggregation in Wireless Sensor Networks

Chi Lin et al.,[2] proposed Energy Efficient Ant Colony Algorithms for Data Aggregation in Wireless Sensor Networks. One of the most effective swarm intelligence that is applied in wireless sensor network is ant colony optimization(ACO), each ant in aco considered to have individually limited cognitive ability. The cooperation of ants which find optimal solutions in graphics the process of ACO. DAACA for data aggregation is a family of ant colony optimization it include three phases initialization, packet transmission and operations on pheromones. The

remaining energy and the amount of pheromones of neighbour node to select the next hop are estimated in the transmission phase. DAACA shows energy efficiency, increases the network lifetime, success ratio of one hop transmission and computation complexity . The computational problems can be solved by using this probabistic mechanism and the good paths can be founded by using ACO.

3.3 Connectivity preserving localized coverage algorithm for area monitoring using wireless sensor networks

Sudip Misra etal.,[3] proposed connectivity coverage algorithm for area monitoring using wireless sensor networks . Connectivity and coverage are the major factors that affecting the operation of the wireless sensor network. Good coverage is achieved by using minimum number of sensor nodes. Main feature of the covering algorithm is that it will keep a subset of nodes as active to maintain the coverage. For an efficient algorithm it will keep minimum number of nodes as active to achieve the coverage and also it minimizes the energy consumption of the network. By using the Euclidean distance based coverage scheme area of monitoring is covered effectively and it can be extendable to large scale sensor networks.

3.4 The Maximum Coverage Set Calculated Algorithm for WSN Area Coverage

Xin He et al.,[4] proposed the maximum coverage set calculated algorithm for wsn area of coverage. Coverage problem is one of the most important problems in wsn and it reflects the quality of service of a particular sensor network. K-Cover algorithm can prolong network lifetime. All the nodes are divided into K coverage node set and each coverage node set can cover the entire area. In this case the maximum coverage set number is difficult to calculate . So the new technique has been emerged with the concept of node minimum layer overlapping subfields (MLOF).Minimum coverage layer number of network area is calculated by MLOF. Maximum number of coverage node set is obtained from this. From the maximum number of node set, it divides the node set. Finally, the distributed maximum coverage set number calculated.

3.5 Grid Based Wireless Mobile Sensor network Deployment with Obstacle Adaptability

Mr. Mayur C et al.,[5] proposed Grid Based Wireless Mobile Sensor network Deployment with Obstacle Adaptability. Coverage and full connectivity are very important problems in wireless sensor network. Suppose an obstacle came over the target field it should be managed carefully during deployment. To achieve k-connectivity a self-deployment scheme implemented. In this approach the target area of the sensor is divided into square grid of n*n. The algorithm deploys the square grid to achieve maximum coverage and k connectivity. The algorithm proposed has the capability to solve obstacle adaptability also it reduces the communication overhead , movement of sensor nodes which helps to improve network life time.

3.6 A Hybrid Multiobjective Evolutionary Approach for Improving the Performance of Wireless Sensor Network

Flávio V. C. Martins et al.,[6] proposed a multiobjective hybrid optimization algorithm. The major aim of this approach was to solve the Dynamic coverage and connectivity problem(DCCP) in flat WSNs . It combines multiobjective global on-demand algorithm that helps to improve the DCCP solution using genetic algorithm . This approach provides one of the best method for enhancing the network lifetime, coverage and connectivity.

3.7 A virtual square grid-based coverage algorithm of redundant node for wireless sensor network

Yanheng Liu et al .,[7] proposed VSGCA for wireless sensor network .Each sensor node has a sensing range in virtual square grid-based coverage algorithm(VSGCA) this sensing range of each sensor node divides into square grids .The node is redundant if all the grids are covered by neighbours. The method cover and judge helps to achieve full coverage and connectivity by using minimum number of active nodes it also eliminate the redundant nodes from the network . VSGCA can also guarantee better performance, lower computational complexity.

Table 3.1: Comparison

Algorithm	Coverage Achieved	Connectivity	Red Undant Nodes Removed	High Network Lifetime
Artificial Bee Colony Algorithm For Dynamic Deployment Of Wireless Sensor Networks(2012)	Y	Y		
Energy Efficient Ant Colony Algorithms for Data Aggregation in Wireless Sensor Networks(2011)	Y			Y
Connectivity preserving localized coverage algorithm for area monitoring using wireless sensor networks(2011)	Y	Y		
The Maximum Coverage Set Calculated Algorithm for WSN Area Coverage(2010)	Y			Y
Grid Based Wireless Mobile Sensor network Deployment with Obstacle Adaptability(2012)	Y	Y		
A Hybrid Multiobjective Evolutionary Approach for Improving the Performance of Wireless Sensor Network(2011)	Y			Y
A virtual square grid-based coverage algorithm of redundant node for wireless sensor network(2012)	Y	Y	Y	Y

III. CONCLUSION

Coverage and connectivity are the most essential element of a WSN. In this paper we surveyed on Contrasted with different calculations and we have examined VSGCA can promise scope, integration, longer system lifetime and elite by utilizing least number of dynamic nodes. It out performs contrasted and different calculations additionally it take out the repetitive nodes from the system.

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