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A new model approach for data sensing and transmission with minimum redundancy in data mining

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ABSTRACT

Energy is the main constraint of wireless sensor networks (WSNs) due to irreplaceable and limited power sources of the sensor nodes. Clustering is the most popular topology control method to reduce energy consumption and improve scalability of WSNs. various approaches have been used for formation of efficient clustering in WSN so that energy consumption can be reduced. Maximum amount of energy that consumed in WSN is during data transmission. In WSN redundant information that is sensed value by nodes has been transmitted. Redundant information that has been transmitted to sink node causes wastage of huge amount of energy during data transmission, which comprises various nodes for establishment of route for data transmission.

Keywords:WSN, Routing in WSN, LEACH, M-LEACH.

I.INTRODUCTION

1.1 Wireless Sensor Network: A wireless sensor network is a group of specialized transducers with a communications infrastructure for monitoring and recording conditions at diverse locations. Commonly monitored parameters are temperature, humidity, pressure, wind direction and speed, illumination intensity, vibration intensity, sound intensity, power-line voltage, chemical concentrations, pollutant levels and vital body functions.The more modern networks are bi-directional, also enabling control of sensor activity. The development of wireless sensor networks was motivated by military applications such as battlefield surveillance; today such networks are used in many industrial and consumer applications, such as industrial process monitoring and control, machine health monitoring, and so on [9].

1.2 Applications of Wireless Sensor Network

Wireless sensor network has been used in different application to provide solution to various problems that faces in real world life. These applications of WSN have been described below.

1.2.1 Process Management

The common application of WSN is area monitoring. In area monitoring, the WSN is deployed upon an area where some phenomenon is to be monitored.

1.2.2 Health care monitoring

The medical application of two types that isable and implanted. First device are used on the body surface of a human and also just at close proximity of the user. The implantable medical devices are those which are inserted within the human body.

1.2.3 Environmental/Earth sensing

In monitoring environment there is so much application, examples of which are given below. They share the extra challenges of harsh environments and reduced power supply.

1.2.4 Air pollution monitoring

Wireless sensor networks have been deployed in several cities to monitor the concentration of dangerous gases for citizens. These can take advantage of the ad hoc wireless links rather than wired installations, which also make them more mobile for testing readings in different areas.

1.2.5 Landslide detection

A landslide detection system makes use of a wireless sensor network to detect the slight movements of soil and changes in various parameters that may occur before or during a landslide.

1.4 Routing protocols in WSN

The WSN routing protocols can be further classified on the method used to acquire and maintain the information, and also on the basis of path computation on the acquired information.These protocols are:-

- Flat- based protocol
- Hierarchy- based protocol
- Location- based protocol

Hierarchical-basedRouting

These protocols outperform the other routing types in saving energy,extending a lifetime of wsn and sclability. The hierarchical-based routing partitions the network into multiple groups. Each group contains one head node and many member nodes.Based on its architecture,several hierarchical routing protocols have been residential to deal with the scalability and energy consumption challenges of WSNs.

1.4.2 Low energy adaptive cluster hierarchy(Modified-LEACH)

LEACH is an initial energy routing protocol which is avoided an energy consumption and improved network lifetime. LEACH algorithm considers homogeneous wireless sensor network where the base station is positioned in the centre of the simulation region and bounded by multiple clusters. It is implemented in two parts:

Setup Phase and Steady phase

In cluster set up phase,phase formation of cluster occurs in a self-adaptive mode. In steady state, transformation of data takes place.The second state takes more time as compared to first state because it saves the protocol payload.

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$$T(n) = \frac{P}{1 - P \times (r \bmod P^{-1})} \quad \forall n \in G$$

$$T(n) = 0 \quad \forall n \in G$$

Where n is a random number between 0 and 1
P is the cluster-head probability and
G is the set of nodes that weren't cluster-heads the previous rounds

Where T(n) denotes threshold.

1.4.3 Proposed work

Proposed algorithm Steps

In the process of M-Leach routing protocol different steps have to be carried out for WSN energy optimization in this process various steps has been explained below.

Step 1: Nodes have been deployed in the simulation are by assigning different locations to the nodes in a particular area.

Fori=1 to number of nodes

Step 2:

The network has been divided into different clusters and cluster head selection has been done on the basis of

t<= (p/ (1-p*mod(r, round (1/p))));

Where t is a random generated number and p represented probability of a node to become a cluster head.

End for loop

Step 3:in this phase after selection of cluster head distance of the cluster head from base station has been measure on the basis of Euclidian distance measurement

Distance=

Where (x2,y2) and (x1,y1) are the co-ordinates of base station and cluster head respectively.

End for loop

Step 4: after decision of distance measurement energy computation in the data transmission from cluster head to base station has been measured.

Data=CSV-PSV

If data >= ST

If distance > do

Energy= (ETX+EDA)* bits+Emp*bits*$(distance)^4$

Else

Energy= (ETX+EDA)* bits+Emp*bits*$(distance)^2$

End if

Step 5:after energy computation of transmission of data nodes energy has been computed and the step 2 to 4 has been repeated until all the rounds has been accomplished

II.REVIEW OF LITERATURE

MdAzharuddin*et al*.proposed that the main problem of WSN is to reduce energy consumption and limited power sources of the sensor nodes. To reduce the energy consumption, clustering is the main method and increases the scalability. In a cluster based WSN, cluster heads (CHs) consume more energy due to extra work load owing to data collection, data aggregation and their communication to the base station. So, the efficient cluster formation is very challenging by considering the energy consumption of the CHs. This is also very difficult with the fault tolerant issue of WSNs as the sensor nodes are prone to failure. Thus, a distributed fault-tolerant clustering algorithm called DFCA was introduced which uses a cost function of the CHs for the formation of cluster and also presented a distributed run time recovery of the sensor nodes from the faulty cluster due to sudden failure of the CH.

Jayashri D. Gaurkar et al. carried out a review on routing protocol in WSNs which are classified as data-centric, hierarchical and location based depending on the network structure [10]. Multipath routing protocols improve the load balancing and quality of service in WSN and also provide reliable communication. Energy Efficient and Reliable Routing Protocol (EERRP) uses clustering hierarchical structure to efficiently decrease the amount of data transmissions between nodes and the base station (BS). EERRP is able to improve the reliability of the traffic transmission, in the same time reduce the energy consumption of the whole network. Saving the nodes energy leads to an increase in the node life in the network, in comparison with the other protocols. Furthermore, the protocol reduces propagation delay and loss of packets.

P. Madhumathy et al. proposed to design a Mobile Sink Based Reliable and Energy Efficient Data Gathering technique for WSN [12]. In this process, a biased random walk method is using to determine the next position of the sink. Then, a rendezvous point selection with splitting tree technique is used to find the optimal data transmission path. When the data is sensing and ready for transmission, the sensor node encodes the data and communicates it to the sink. On receiving the encoded data from the sensors, the mobile sink decodes the messages and stores the resulting block in its local buffer. Once all blocks have been correctly decoded, the mobile sink reconstructs the original bundle. The increased packet losses in a specific region of the network can be prevented by increasing the pause time of the sink. By simulation results, the proposing technique increases the reliability and energy efficiency.

Deshpande, V.V. et al suggested that it is vital to reduce energy consumption to improve lifetime of wireless sensor network [15]. A proficient way to improve lifetime is to partition sensor network into groups called cluster with high energy node acting as leader of the cluster called cluster head. Cluster head is responsible for managing intra-cluster and inter cluster communication. Energy level of cluster head at a given point of time determines life of cluster and thereby whole sensor network. Failure in the cluster head brings cluster communication to halt and may require re-clustering to get sensor network back on track. These activities involve additional energy expenditure and ultimately possess great impact on lifetime of sensor network as a whole. To balance energy consumption among the cluster heads this paper proposed to have cluster of cluster heads within the cluster of sensor nodes.

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III.METHDOLOGY

In the purposed work soft threshold approach has been implemented that utilized threshold value for data transmission. In this process threshold value has been steeled that used for investigating changed in sensed value of the data. In this process a can transmit data to cluster head until the new sensed value has minimum difference of soft threshold value from previous sensed value by a node. In the process of WSN deployment various scenarios have been used for performance evaluation of proposed work. In this process number of nodes deployed in the network has been varied. In the proposed work scenario that has been developed for WSN are 100, 150, 200 and 300 nodes based.

In the purposed work energy optimization has been done to enhance the performance of the network. In the purposed work various parameters have been analyzed for performance evolution of purposed work.

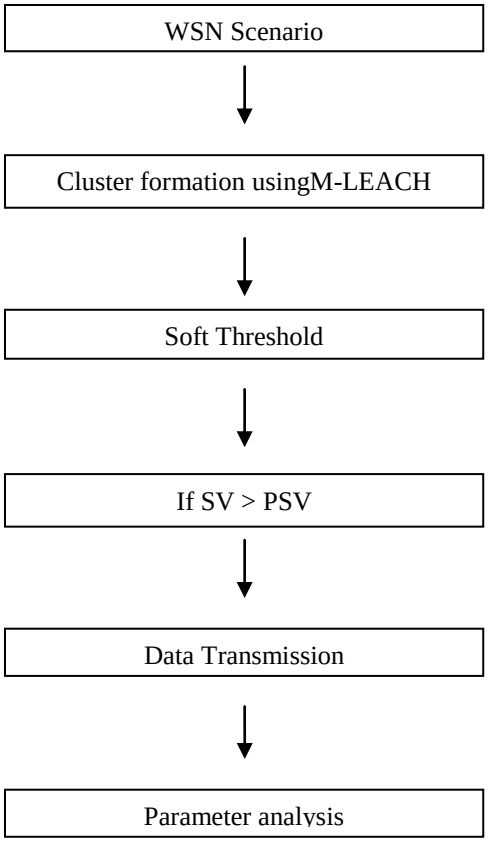

Fig 5.1 Flow of purposed work

This figure represents flow of the purposed work that must be carried out for achievement of desired objectives. In this flow various steps have been explained that must be followed by the user for development of congestion control wireless sensor network.

IV.RESULTS

On the basis of routing protocol route has been selected for data transmission to base station via various cluster heads. In the process of data transmission a cluster member transmit sensed information to cluster head and cluster head transmit to other cluster head that have route to transmit information to base station.

Scenario 1: In these scenario 200 nodes has been deployed in the simulation area in the area of 100 * 100. These nodes have been used for data transmission using different routing and clustering protocols.

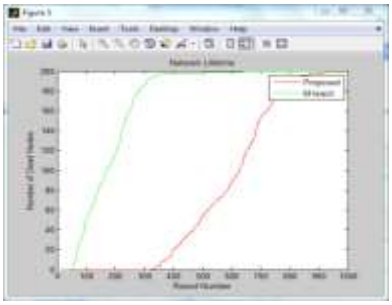

Fig 4.1 Network Lifetime 200 nodes in 100 * 100 areas

This figure represents network lifetime that has been achieved by the WSN using purposed approach. In this process different nodes energy has been exhausted in the processing of data transmission. Network lifetime has been measured on the basis of last node dead during number of rounds of simulation. In the processing of WSN various approaches have been used for data sensing and transmission from a particular area.

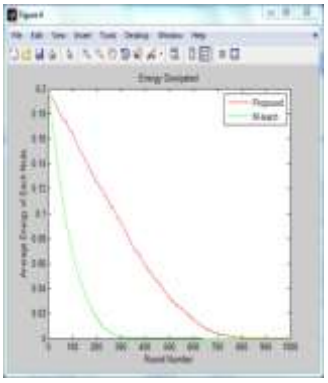

Fig 4.2 Average Energy dissipation using 200 nodes in 100 * 100 areas

This figure represents average amount of energy available in the network after completion of a single round. In this process different nodes energy has been exhausted in the processing of data transmission. Average amount of energy has been measured by using ratio of overall residual energy having all the nodes to total number of nodes available in the network. Various approaches have been simulated for wireless sensor network that have been used for data transmission from sensor nodes to base station.

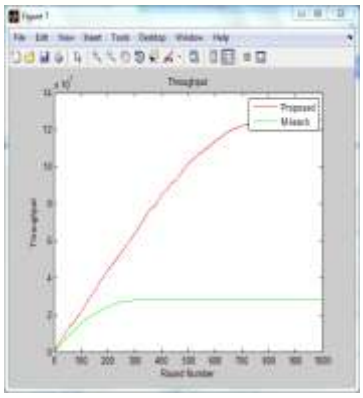

Fig 4.3 Throughput of WSN 200 nodes in 100 * 100 areas

This figure represents throughput of network. In this process different nodes energy has been exhausted in the processing of data transmission. Throughput is measured on the basis of total number of bytes transmitted over the network per unit interval of time. On the basis of analysis of above defined figure proposed approach provide maximum throughput over the network.

VI.CONCLUSION& FUTURE SCOPE

Conclusion:WSN is the emerging field of communication for transmission of sensing information from the sensing environment using different sensor nodes. On the basis of these threshold values hard and soft threshold values redundant information does not transmitted again and again to the cluster head that decrease in data aggregation and transmission energy. Soft threshold has been defined in the network so that small change in sensed value that has been sensed by the node must be greater or less that previous sensed value that has been transmitted in previous round by the node. This redundancy in data transmission causes network overhead and wastage of network bandwidth. In the purposed work soft threshold used for data transmission reduced network overhead due to routing packets and reduction in energy consumption.

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