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An Enhanced Compressed Sensing Approach for Path Reconstruction in Wireless Sensor Networks

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ABSTRACT: Through Compressive sensing (CS) the figure of data transmissions and balance the traffic load throughout networks can be decreased. As the whole transmissions for data gathering by using authentic CS are still heavy. For that hybrid method of using CS was projected in sensor networks. The preceding works by CS method on routing the trees. The paper, a clustering technique was planned that uses hybrid CS for WSNs. As the sensor nodes are ordered as clusters. In a cluster, nodes send out data to cluster head (CH) without CS. CH uses CS to transmit data to sink. Firstly an analytical model is suggested that studies the correlation between the size of clusters and number of transmissions. The main aim is to find the most favorable size of cluster which can lead to least number of transmissions. Then, a centralized clustering was proposed based on the results obtained from the former analysis. At final phase, a circulated implementation of the clustering method was proposed. Some advanced simulations to confirm that proposed method can decrease the number of transmissions.

KEYWORDS: Wireless sensor networks, compressive sensing, data collection, clustering, cluster heads compression.

I. INTRODUCTION

A wireless sensor network consists of a multiple sensor nodes that are associated to each other wireless. These are small, low-cost, low-power and their sensor nodes can communicate in limited distances. Sensor nodes consist of sensing, data processing, and communication devices. Huge number of these sensors collaborate form a wireless sensor networks .A WSN usually consists of upto thousands of likely nodes that communicate with unwired channels for information sharing and cooperative execution of nodes. To make ensure scalability and rise in the efficiency of the network operations sensor nodes are often grouped into clusters. There would be large economic and environmental gains if these large, bulky, expensive macro-sensor nodes are replaced with much more number of cheap micro sensors that can be easily deployed. This would save cost significantly in the nodes itself as well as in the deployment of these nodes. These micro-sensor networks would be fault-tolerant as the sheer count of nodes can be ensured that there is enough redundancy in data acquisition that not all nodes must be functional in nature. Data gatherings without using CS, have the nodes close to tree leaves relay fewer packets for other nodes, but the nodes close to the sink have to relay much more packets. With the using CS in data gathering, each node requests for transmitting M packets for a set of N data items. i.e. the amount of transmissions for collecting data from N nodes is MN.
In the hybrid method, the nodes near to the leaf nodes send out the original data without CS method, but the nodes near to the sink transmit data to sink by the CS method. Hybrid CS in the data gathering projected an aggregation tree with minimum energy consumption. The earlier work uses the CS method on routing trees. Since the clustering method has many advantages over the tree method such as fault tolerance and traffic load balancing, the CS method on the clustering in sensor networks is applied. The clustering method normally has enhanced traffic load balance to compare with the tree data gatherings method. This is because the number of nodes in clusters can be balanced by dividing the clusters. Additionally to the previous works unobserved the geographic locations and node distribution of the sensor nodes.

1.1 Plan of the paper

Many researchers have developed techniques of Data Gathering Using Compressive Sensing In wireless Sensor Networks, here, Section explains about objective concerning Compressive Sensing In wireless Sensor networks and till dates work, this section explains the transmission type and related discussion. Section IV shows the procedural flow of the system, V describes the procedure, VI will shows the experimental analysis and VII section concludes the paper.

II. OBJECTIVE

Secure data transmission is a critical issue for Wireless Sensor Networks (WSNs). Clustering is an significant and most practical way to improve the system performance of WSNs. In recent years, wireless communication due to rapid decrease in hardware costs and with portability has become one of the most role playing communicative methods in our daily life. Many people communicate with others through wireless environment merely every day. Anyway, from privacy point of view, wireless security is a crucial challenge since messages are delivered to the corresponding destinations via the air where the hackers can maliciously intercept the messages and decrypt the messages. A Clustering sensor is an efficient method and a crucial phase in Wireless Sensor Network (WSN). Clustering is a technique where tiny light weight, low cost and low power sensor nodes are grouped in to some clusters. Wireless sensor networks are of tiny size, lower in cost, lower in energy and with multifunctional sensors that are densely deployed for monitoring environments, object tracking or industrial operation control. In routing protocol transmission of data is the one of the important factors that causes a fast draining of energy between nodes and base station. Compression techniques reduce the data which also results in reducing the energy consumption of the network. The successful method developed in this work will predicts to offer new border of mind for research in together compressive sampling applications and wide range wireless sensor networks. Considering about the scenario in which a bulky number of sensor nodes are deployed compactly and sensor readings are interrelated spatially. The planned compressive data gathering is able to decrease globally scaled communication cost by not introducing concentrated computation or complex transmission control. The load balancing attributes are capable to extend the lifetime of the whole sensor network as well as personal sensors. Furthermore, the presented scheme will manage through irregular sensor readings worthily. We also take out the examination of the network capability of the well planned compressive data gatherings and also authenticate the analysis through ns-2 simulations.

III. TRANSMISSION TYPE

We have two levels of transmission types in clustering mechanism using the hybrid CS: intracluster transmissions that did not use CS methods and internal cluster transmission that use the CS technique. The data size in intercluster transmissions similar to intracluster transmissions. Thus, reducing the number of transmissions can reduce the energy consumption effectively on sensor nodes. For intracluster transmissions, we simply let sensor nodes transmit their data to the CH following the shortest path routing (in terms of number of hops). For intercluster transmissions, we construct a minimal cost backbone tree that connects all CHs to the sink and transmit the data projects through this back bone tree.

An important task of our method is to determine the cluster size. As cluster size increases, the number of intracluster transmissions will increase sharply. But when decreasing the size of the cluster, the count of clusters will increase and the count of intercluster transmissions would increase. There exists an cluster with optimal size that minimize the whole number of data transmissions in the hybrid CS method. Our task is determining the optimal size of the cluster and to design a cluster in distributed method, such that the total number of transmissions is minimized.

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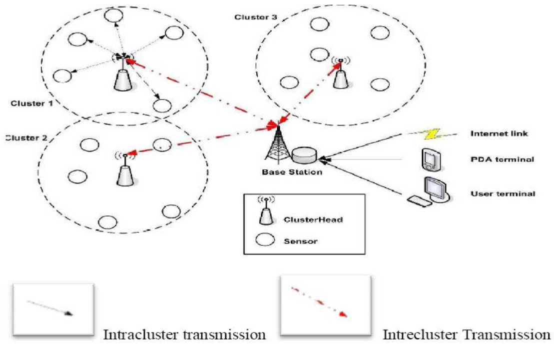
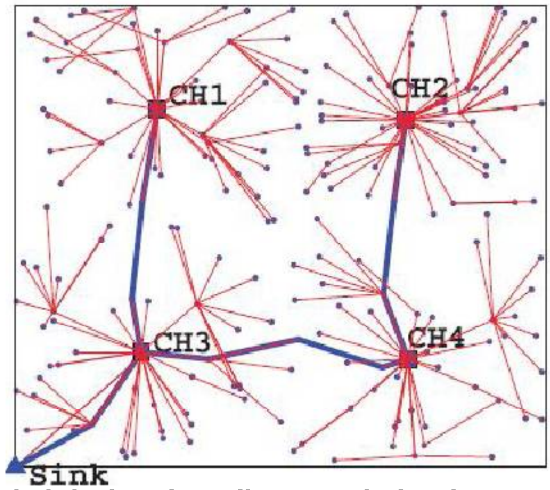


Fig 3.1 : Intercluster & intracluster Transmission

IV. PROCEDURAL FLOW OF THE SYSTEM

1. Start
2. Node Deployment
3. Neighbor Calculation
    3.1. If Ch(Cluster Head) Exist
        3.1.1. Broadcast Message
    Else
        3.1.2. Cluster Head Elect Message
4. Data Communication With Cluster
    4.1. Cluster Formation
    4.2. Data Aggregation
5. Performance Evaluation
6. Stop



4.1 The hybrid CS data collection method in cluster structure

V. DESCRIPTION OF SYSTEM FLOW

1. After a CH is elected, it broadcasts an advertisement message to remaining sensor nodes in the sensor field, to invite the sensor nodes to join related cluster. The information is carried with an advertisement message: the identifier and location of the CH, and the hop count that the message has transmitted. The hop count is set to be 0.
2. When a sensor node receives an advertisement message, if the message hop count is smaller than the recorded one from the same CH, it updates the information in its record which includes the node of previous hop and the count of hop to the CH, and further broadcasts the message to its neighbors; the message will be discarded otherwise. The maximal hop count for the advertisement message is set to D*hops, so that all nodes can receive the advertisement messages from at least one CH.
3. After the advertisement of CH completes, every non-CH node decides to cluster their joins. The decision is based on the number of hops to every CH. The route to the CH from a sensor node follows the reverse path in forwarding the advertisement message. The sensor nodes data of every cluster is collected by this routing tree.
4. A backbone tree is constructed in, where all CHs and the sink connected in distributed manner. Through the broadcasting of the advertisement messages from CHs, every CH receives the messages from the other nearest CHs. Thus, it has the knowledge about the locations of its nearest Cluster Heads and the count of hops to them. Since the

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sink needs to broadcast the central point's data to all sensor nodes, which know the location of the sink and the hop distance to it.

VI. EXPERIMENTAL RESULT ANALYSIS

Comparison of No. of transmission: is the number of report messages the sink receives from all the cluster head nodes & End to end latency: It refers to the time taken for a packet to be transmitted across a network from source to sink node with packet loss

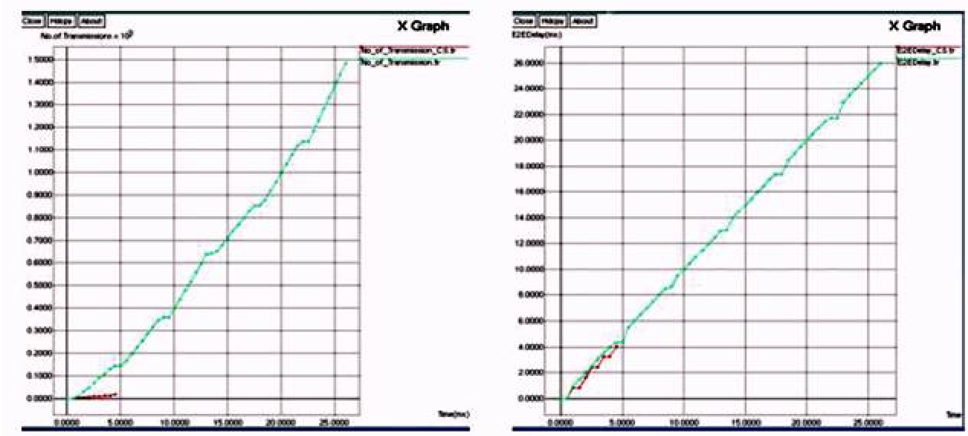

Fig 6.1: Comparison of No. of transmission End to end latency with packet loss

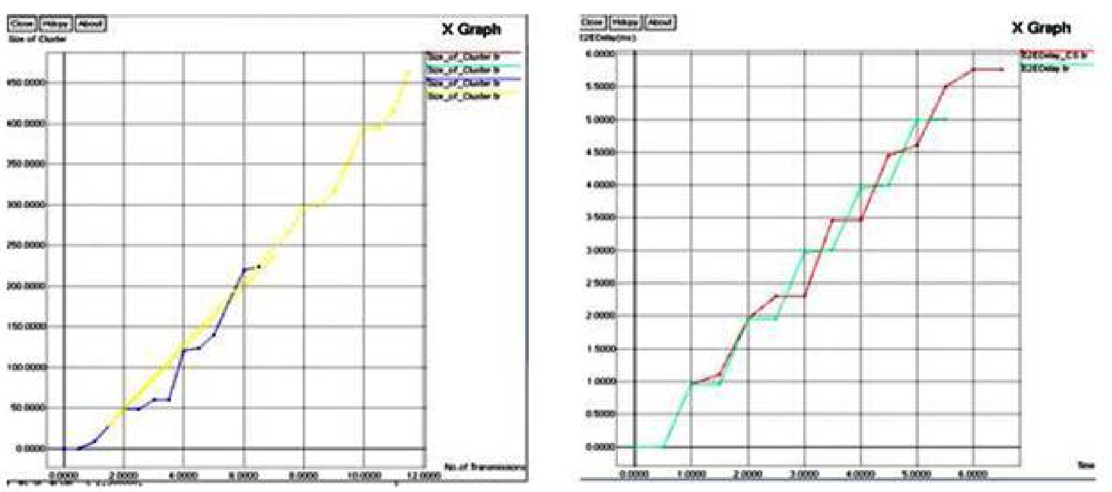

Fig 6.2: Comparison of Size of cluster & consistence End to end latency

Size of cluster: It refers the relationship between size of cluster and no of transmission The recorded details are stored in the trace file. The trace file is executed with X graph to retrieve graph as output

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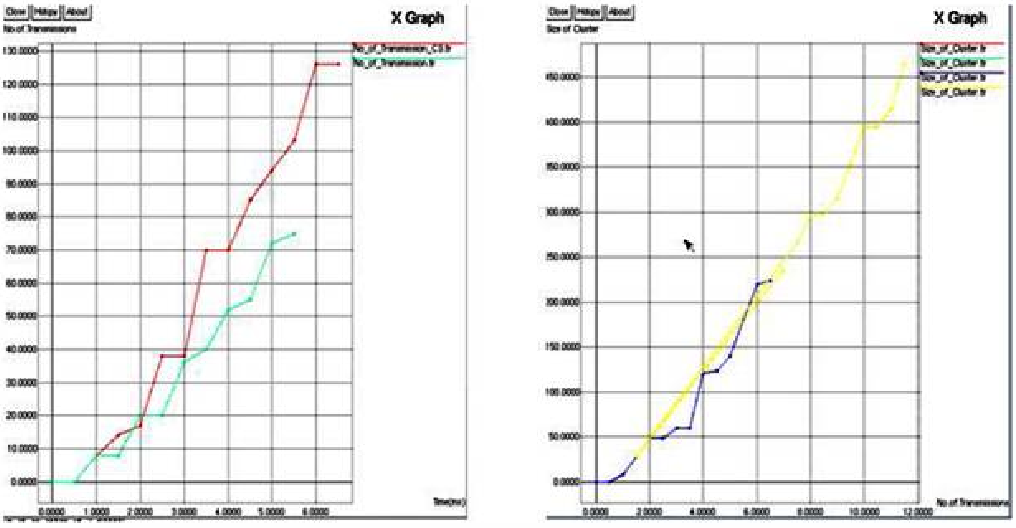

Fig 6.3: Comparison No. of transmission & Size of cluster

Size of cluster: It refers the relationship between size of cluster and no of transmission
Comparison of No. of transmission: the number of report messages the sink receives from the total cluster head nodes .The recorded details are stored as file traces. Those traces are executed by using X graph to get graph as the output.

VII. CONCLUSION

The data at locations and distributed of sensor nodes is used to design the data collection method in cluster. Clusters are pre arranged with sensor nodes. Within a cluster, data are collected to the cluster heads by shortest path route; data are compressed to the projections using the CS technique at cluster head. The projections are forwarded to the sink following a backbone tree. We first proposed an diagnostic model that studies the connection among the number of transmissions and clusters size in the hybrid CS method, to find the most favorable size of clusters that can lead to least number of transmissions.

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J.Chaitanya has received his B.Tech degree in Information Technology from sree vidyanikethan Engineering college affiliated to JNTU, Anantapur in 2014 and pursuing M.Tech degree in Computer science and Engineering in Narayana College of Engineering affiliated to JNTU, Anantapur in 2014-2016.

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