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REVIEW ON “TRANSMISSION EFFICIENT DATA GATHERING USING COMPRESSIVE SENSING IN WIRELESS SENSOR NETWORK”

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Abstract: Compressive sensing (CS) can decrease the figure of data transmissions and balance the traffic load throughout networks. However, the overall transmissions for data gathering by using pure CS are still huge. The hybrid method of using CS was projected to decrease the figure of transmissions in sensor networks. However, the preceding works utilize the CS method on routing trees. In this paper, we plan a clustering technique that uses hybrid CS for sensor networks. The sensor nodes are ordered into clusters. Inside a cluster, nodes send out data to cluster head (CH) not including CS. CHs use CS to transmit data to sink. We first suggest an analytical model that studies the correlation between the number of transmissions and size of clusters. In the hybrid CS method, aiming at finding the most favourable size of clusters that can lead to least number of transmission. Then, we propose a centralized clustering algorithm based on the results obtained from the analytical model. At last, we present a circulated implementation of the clustering method. Extensive simulations confirm that our method can decrease the number of transmissions extensively.

Keywords: Wireless sensor networks, compressive sensing, data collection, clustering

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INTRODUCTION

A wireless sensor network is a network which consists of a number of sensor nodes that are wirelessly associated to each other. These small, low-cost, low-power and multifunctional sensor nodes can communicate in short distances. Sensor nodes consist of sensing, data processing, and communication components. Large number of these sensor nodes collaborated forms a wireless sensor networks .A WSN usually consists of tens to thousands of such nodes that communicate through wireless channels for information sharing and cooperative processing. To ensure scalability and to increase the efficiency of the network operations sensor nodes are often grouped into clusters .The sensors must be placed in exact locations since there are a limited number of nodes extracting information from the environment. The deployment of these nodes and cables is costly and awkward requiring helicopters to transport the system and bulldozers to ensure the sensors can be placed in exact positions. There would be large economic and environmental gains if these large, bulky, expensive macro-sensor nodes could be replaced with hundreds of cheap micro-sensor nodes that can be easily deployed. This would save significant costs in the nodes themselves as well as in the deployment of these nodes. These micro-sensor networks would be fault-tolerant as their sheer number of nodes can ensure that there is enough redundancy in data acquisition that not all nodes need to be functional. By using wireless communication between the nodes would eliminate the need for a fixed infrastructure. In data gathering without using CS, 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 to transmit M packets for a set of N data items. i.e. the amount of transmissions for collecting data from N nodes is MN , which is still a outsized figure. 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 and 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, we apply the CS method on the clustering in sensor networks. The clustering method normally has enhanced traffic load balancing compare with the tree data gathering method. This is because the number of nodes in clusters can be balanced when we divide clusters. In addition, the previous works unobserved the geographic locations and node distribution of the sensor nodes. As in sensor networks, the information of node distribution can help the structure of data gathering method that uses fewer data transmissions

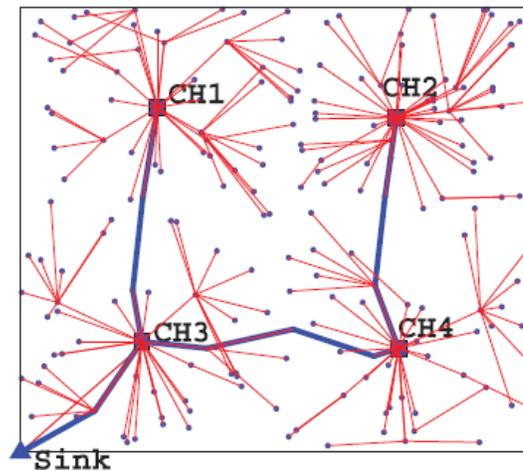


Fig: The hybrid CS data collection method in cluster structure[1]

1.1 Plan of the paper

Many researchers have developed techniques of Data Gathering Using Compressive Sensing In wireless Sensor Network, here, Section II presents literature concerning Compressive Sensing In wireless Sensor network and work done till date, Section III explains the problem statement and related discussion. Section IV shows the Objective of the Paper V concludes the paper.

I. Literature Survey

Ruitao Xie and Xiaohua Jia, Fellow, IEEE, Computer Society' Transmission-Efficient Clustering Method for Wireless Sensor Networks Using Compressive Sensing'in 2014, proposes a clustering method that uses hybrid CS for sensor networks. The sensor nodes are organized into clusters. Within a cluster, nodes transmit data to cluster head (CH) without using CS. CHs use CS to transmit data to sink.

Sheenam1, Navdeep Kaur2 ' Improvement of Energy Efficiency of Compressive Sensing in Wireless Sensor Networks' in 2014 proposes Wireless sensor network used in many applications like electronic commerce, mobile communications and smart cards. This survey paper aims at reporting an overview of WSNs technologies, component, and network throughput.

Vinoda B Dibbad1, C M Parameshwarappa2' A Secure Data Transmission for Cluster based Wireless Sensor Network Using LEACH Protocol'in 2014 propose a security solution for LEACH (Low-Energy Adaptive Clustering Hierarchy), a protocol where clusters are formed dynamically and periodically. A LEACH protocol effective one to reduce and balance the total energy consumption for CWSNs.

Jiping Xiong and Qinghua Tang '1-Bit Compressive Data Gathering for Wireless Sensor Networks' in 2014 propose a novel blind 1-bit CS reconstruction algorithm which outperforms other state-of-the-art blind 1-bit CS reconstruction algorithms under the settings of WSN. Experimental results on real sensor datasets demonstrate the efficiency of our method.

Menaga.M 1, R.Sudha²'Energy Efficient Approach For Mobile Data Gathering in Wireless Sensor Networks' in 2013 proposes an extensive simulation study, and the results indicate that CST-BRH method is superior over traditional in-network data compression techniques for practical sensor network settings. This analyze the trade-off between energy saving and data gathering latency in mobile data gathering.

Saeed Mehrjoo, Hassan Aghaee, Hossein Karimi¹'A Novel Hybrid GA-ABC based Energy Efficient Clustering in Wireless Sensor Network' in 2011 proposes An efficient method to reduce the energy consumption of the nodes and thus improve the life time of the WSN is reducing the number of transmissions through clustering the nodes.

Nandini. S. Patil, Prof. P. R. Patil 'Data Aggregation in Wireless Sensor Network' in 2010 Proposes a work is to compare the performance of TAG in terms of energy efficiency in comparison with and without data aggregation in wireless sensor networks and to assess the suitability of the protocol in an environment where resources are limited.

Ahmed Aziz², Ahmed Salim¹, and Walid Osamy²'Adaptive and Efficient Compressive Sensing ' in 2010 proposes based Technique for Routing in Wireless Sensor Networks' An adaptive and efficient technique based on compressive sensing (ECST) for improving the performance of routing in wireless sensor network. The performance of our technique is evaluated by applying it to PEGASIS (power efficient gathering in sensor information systems),

II. Problem Definition

In data gathering without using CS, 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 CS in data gathering, all nodes want to transmit M packets for a set of N data items. That is, the number of transmissions for collecting data from N nodes is MN , which is still a large number. In WSNs, the distributed sensors observe physical changes in designed area. Since each sensor observes similar physical changes, the signals observed from each sensor have much correlation. The correlated signal can be compressed for reducing data. The conventional compression for WSN requires communication between nodes and exploits correlated data in the compression process. Such a transmission strategy makes the network system complex. In contrast Compressive sensing (CS) is a new theory of sampling in many applications, including data network, sensor network, digital image and video camera, medical systems and analog-to-

digital convertors. CS enables a potentially large reduction in the sampling and computation costs for sensing data that have a sparse or compressible representation without relying on any specific prior knowledge or assumption on data. The compressed sensing theory points out that any sufficiently compressible data can be accurately recovered from a small number of measurements without going through many complex signal processing

III. Objective

Secure data transmission is a critical issue for Wireless Sensor Networks (WSNs). Clustering is an effective and practical way to enhance the system performance of WSNs. In recent years, wireless communication due to rapid hardware cost reduction and providing its devices with portability has become one of the most important communication methods in our everyday life. Many people communicate with others through wireless environment almost every day. However, from privacy viewpoint, wireless security is a crucial challenge since messages are delivered to their destinations through the air so hackers can maliciously intercept the messages and decrypt the messages. A Clustering sensor node is an efficient topology and a crucial issue in Wireless Sensor Network (WSN). Clustering is a technique in which small light weight, low cost, low power sensor nodes are grouped in to some clusters. Wireless sensor networks are networks of tiny, low cost, low energy, and multifunctional sensors that are densely deployed for monitoring environments, tracking objects or controlling industrial operations. In routing protocol transmission of data is the one of the most significant factors that causes a quick drain of energy between nodes and base station. Compression techniques reduce the amount of data which also lead to reduce the energy consumption of the network. The successful method developed in this research is predictable to offer fresh border of mind for research in together compressive sampling applications and large-scale wireless sensor networks. We think about the scenario in which a bulky number of sensor nodes are compactly deployed and sensor readings are spatially interrelated. The planned compressive data gathering is able to decrease global scale communication cost without introducing concentrated computation or complex transmission control. The load balancing attribute is capable of extending the lifetime of the complete sensor network as well as personal sensors. Furthermore, the projected scheme can manage with irregular sensor readings gracefully. We also take out the examination of the network capacity of the planned compressive data gathering and authenticate the analysis through ns-2 simulations.

IV. CONCLUSION

The information on locations and distribution of sensor nodes is used to design the data collection method in cluster structure. Sensor nodes are prearranged into clusters. Within a

cluster, data are collected to the cluster heads by shortest path routing; at the cluster head, data are compressed to the projections using the CS technique. The projections are forwarded to the sink following a backbone tree. We first proposed an diagnostic model that studies the connection between the number of transmissions and size of clusters in the hybrid CS method, to find the most favorable size of clusters that can lead to least number of transmissions. Then, we proposed a centralized clustering algorithm depend on the results obtained from the analytical model. Finally, we present a dispersed implementation of the clustering method.

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