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Adaptive and Energy Efficient Compressive Sensing Clustering for Wireless Sensor Networks

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Abstract: **Adaptive and energy efficient compressive sensing clustering for wireless sensor networks. In this paper mainly used the term CS that is compressive sensing. Compressive sensing (CS) can reduce the number of data transmissions and balance the traffic load throughout networks. In this paper used compressive sensing used for clustering method. The enhanced hybrid compressive sensing method of using CS was proposed to reduce the number of transmissions in sensor networks.**

Keywords: **Compressive sensing (CS), cluster head, clustering, wireless sensor networks.**

I. INTRODUCTION

Adaptive and energy efficient compressive sensing clustering for wireless sensor networks mainly used compressive sensing. Compressive sensing (CS) can reduce the number of data transmission and balance the traffic load throughout networks. The hybrid method of using CS was proposed to reduce the number of data transmissions in sensor networks. Here mainly used enhanced hybrid compressive sensing to reduce the number of transmission. In many sensor networks the sensor nodes need to collect data periodically and transmit to the sink through multi hops. The emerging technology of compressive sensing (CS) opens new frontiers for data collection in sensor networks and target localization in sensor networks. The compressive sensing method can substantially reduce the amount of data transmissions and balance the traffic load throughout the entire network. Transmission efficient clustering method for wireless sensor networks using compressive sensing. The existing system mainly used compressive sensing in clustering method. It is proposed a clustering method that uses the enhanced hybrid compressive sensing for sensor networks. In enhanced hybrid compressive sensing has produced the different sensor nodes are organized into clusters. Each cluster has cluster head. Within a cluster, nodes transmit data to cluster head (CH) without using compressive sensing. Cluster head transmit data to the sink by using compressive sensing method.

In the regard, first propose an analytical model that studies the relationship between the size of clusters and number of transmission in the enhanced hybrid compressive sensing method, aiming at finding the optimal size of clusters that can lead to minimum number of transmissions. Then, propose a centralized clustering algorithm based on the results obtained from the analytical model. Finally, present a distributed implementation of the clustering method. In existing system mainly used hybrid compressive sensing. It is used hybrid compressive sensing to design a clustering based data collection, to reduce the data transmission in wireless sensor networks. The information on locations and distribution of sensor nodes is used to design the data collection in cluster structure. The clustering method by using hybrid compressive sensing obtained problem produced that is data loss. That's problem will overcome to produce enhanced hybrid compressive sensing. Enhanced hybrid compressive sensing is solution of the data loss by data transmission of nodes to cluster head to sink. Enhanced hybrid compressive sensing is introduced by adaptive and energy efficient compressive sensing clustering for wireless sensor networks. Enhanced hybrid compressive sensing is reduced delay.

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II. RELATED WORK

An analysis of a large scale habitat monitoring application was the pioneer related work of this paper. Habitat and environmental monitoring is a driving application for wireless sensor networks. The another related work of the adaptive and energy efficient compressive sensing clustering for wireless sensor networks is compressive sensing on routing trees. In clustering method have many advantages over the tree method. That networking together hundreds or thousands cheap micro sensor nodes allows users to accurately monitor a remote environment by intelligently combining the data from the individual nodes. These networks require robust wireless communication protocols that are energy efficient and provide low latency. The clustering methods have many advantages over the tree method. Such as fault tolerance and traffic load balancing. This paper used the compressive sensing method on the clustering in sensor networks. The clustering method generally has better traffic load balancing than the tree data gathering method. The related work ignored the geographic locations and node distribution of the sensor nodes. Another one is an energy efficient hierarchical clustering algorithm for wireless sensor networks. A wireless network consisting of a large number of small sensors with low power transceivers can be an effective tool for gathering data in a variety of environments. The data collected by each sensor is communicated through the network to a single processing centre that uses all reported data to determine characteristics of the environment or detect an event.

III. ENHANCED HYBRID COMPRESSIVE SENSING

Enhanced hybrid compressive sensing can reduce the number of data transmissions and balance traffic load throughout networks. Comparing hybrid compressive sensing and enhanced hybrid compressive sensing, HCS have some drawbacks about the clustering method. Cluster 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. Cluster heads use compressive sensing to transmit data to sink. When a CH fails or runs out of energy, the neighbouring nodes of the CH will detect the failure of the CH. These nodes will broadcast a message to all the nodes in the cluster to start the new CH election. Then they start new CH election this method have data loss. Here enhanced hybrid compressive sensing is implemented to overcome using HCS in clustering method.

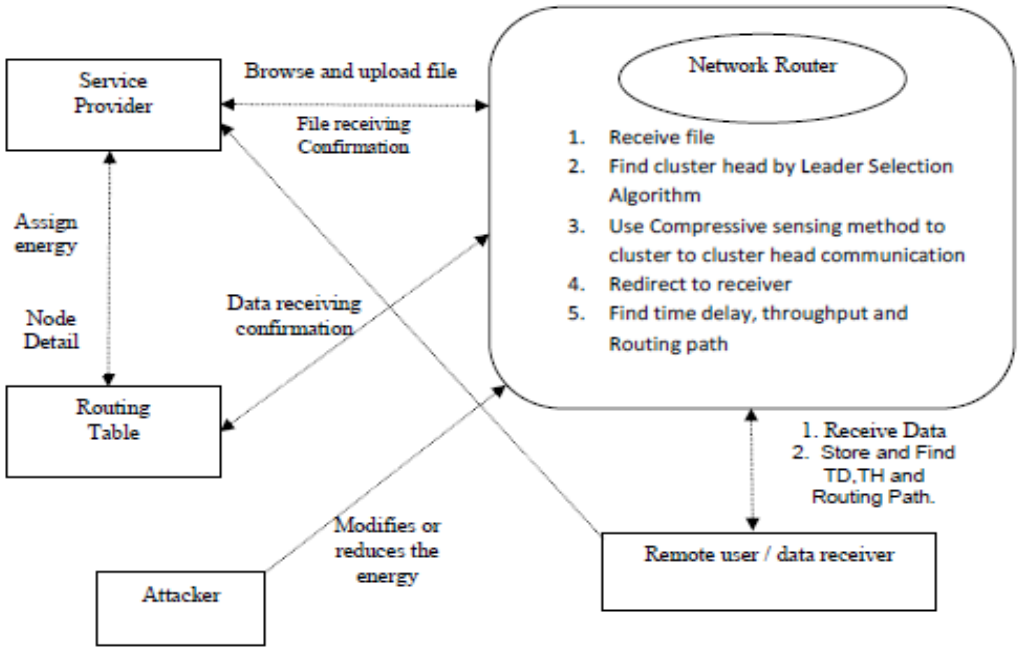

Fig.1. Block diagram

Adaptive and energy efficient compressive sensing clustering for wireless network using EHCS. They contain a base station need to collect M measurements from the network N sensors, then applies compressive sensing to obtain precisely all N sensor readings. In clustered networks, a cluster head collects data from non-CH sensors in its clusters, add all received and its own data then send the combined measurements to the base station. We further analyze the clustered

network with the measurement matrix created by clustering methods, and formulate the total power consumptions. Finally, we suggest the optimal number of clusters for the networks. Consume the least power in practice. And also perform the selection of deputy cluster heads. They have no data loss. These are the working principle of enhanced hybrid compressive sensing.

The system architecture for the proposed system is shown above. The service provides will browse the data file and then upload the browsed file to the router and router will send to particular receivers. The router manages a multiple clusters (cluster 1, cluster 2, cluster 3, and cluster 4) to provide data storage service. In cluster there are N numbers of nodes named as (n2, n2, n3, n4…). Similarly, the cluster head will select different node based on highest energy. The time delay will be calculated according to the concept of routing delay. In cluster N number nodes are present and the clusters are communicates with every clusters. The receiver receives the data file from the service provider through router.

IV. PERFORMANCE EVALUATION

They evaluate the performance of the clustering method using hybrid compressive sensing and enhanced hybrid compressive sensing. Our method is compared with other data collection methods. In use two metrics to evaluate the performance of the clustering with hybrid compressive sensing and EKCS proposed in this paper: the number of transmissions which is required to collect data from sensors to the sink and the reduction ratio of transmissions of our method compared with other methods. In EHCS method compared without CS method, in the shortest path tree without CS, in the SPT with hybrid CS, in the optimal tree with hybrid CS. Number of transmissions compared with CS, SPT without CS, OTCS, SPTHCS, centralized HCS, Dist HCS.

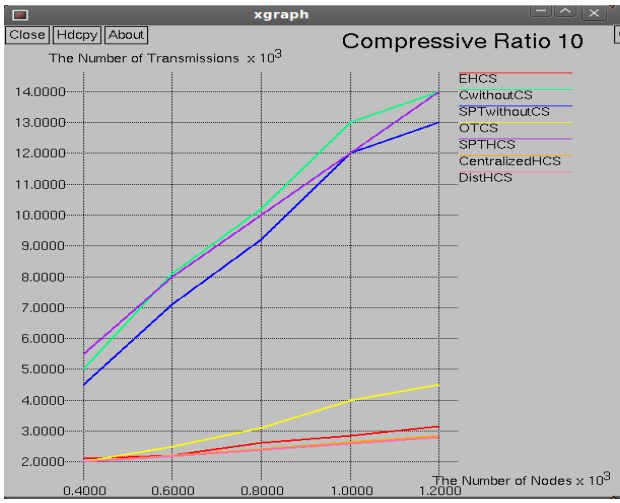

Fig.2a. The number of transmission,the compressive ratio is 10

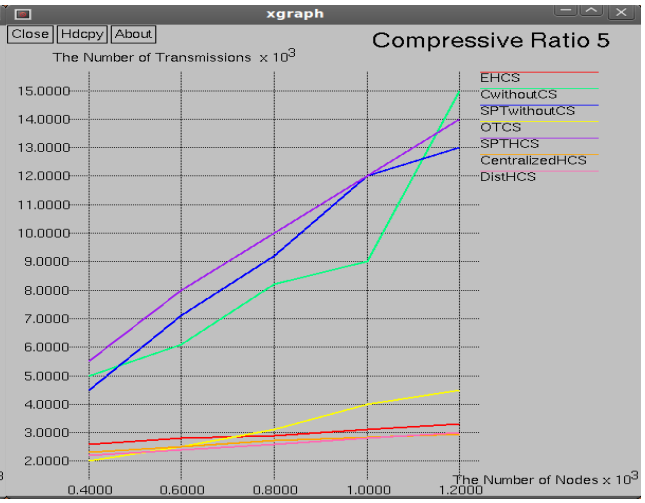

Fig.2bThe number of transmission, the compressive ratio is 5

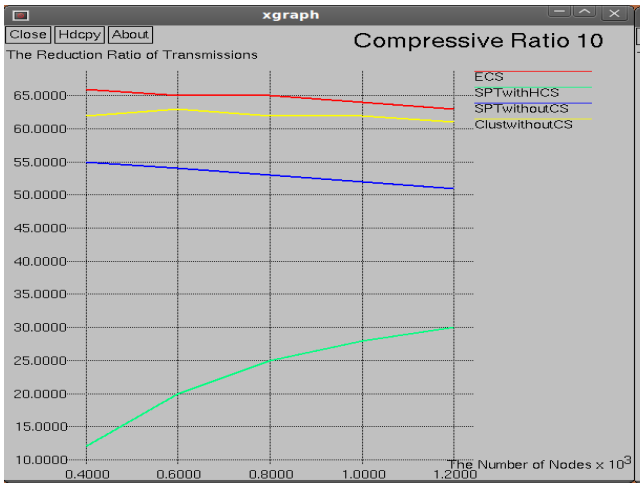

Fig 3a The reduction ratio, the compressive ratio is 10

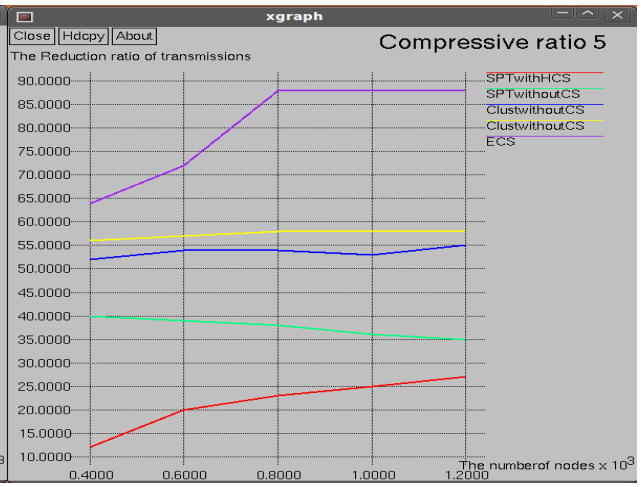

Fig.3b The reduction ratio, the compressive ratio is 5

In comparison between hybrid and enhanced hybrid compressive sensing contains number of transmissions and reduction ratio of transmissions. The number of transmissions with the compressive ratio is 10 and 5. The result of the number of transmissions of enhanced compressive sensing is low compared with other methods. Another is reduction ratio of transmissions with compressive ratio is 10 and 5. The result of reduction ratio is high compared other methods.

V. CONCLUSION

In enhanced hybrid compressive sensing used to design a clustering based data collection method, to reduce the data transmissions in wireless sensor networks. The sensor nodes are organized into clusters. Within a cluster, nodes transmit data to cluster head without using CS. Cluster heads use CS to transmit data to sink. These are the principle obtained by some methods. Adaptive and energy efficient compressive sensing clustering for wireless sensor network using enhanced hybrid compressive sensing. They contain a base station need to collect M measurements from the network N sensors, then applies compressive sensing to obtain precisely all N sensor readings. In clustered networks, a cluster head collects data from non-CH sensors in its cluster, ads all received and its own data then send the combined measurements to the base station. Further analyze the clustered network with the measurements matrix created by clustering methods, and formulate the total power consumptions. Finally, suggest the optimal number of clusters for the networks. Consume the least power in practice. And also perform the selection of deputy cluster heads, they have no data loss. Finally the no of transmissions is low compared with other methods and the reduction ratio of transmissions is high compared with other methods. The all sensor nodes data efficiently transmitted to the sink.

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