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A Critical Review on Data Clustering in Wireless Network

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Abstract

In a wireless network the data is to be transmitted through network to the base station. The data clustering can be applied for the data transmission for achieving better efficiency, network lifetime and stability. We can improve the data selection mechanism by efficient use of clustering techniques. So in this paper we want to elaborate different methodology to find the better clustering technique for the efficient data management. Our study shows that the clustering can improve the lifetime, energy efficiency and head selection.

Keywords

Cluster Head Selection, Clustering, Energy Efficiency, Lifetime.

1. Introduction

Clustering algorithms can be a competent resource management. Clustering prolongs the age by aspect localized at fault and regularized locally aggregated matter within the clusters thereby conserving energy [1]. The bunch of energy overtired in a particular seed is cotemporaneous to the territory of the specified range. It is a pool of energy efficient objects for the different directions from sensor nodes to send their data directly to a distant base station [2][3][4][5].

A wireless sensor network (WSN) is a collecting of nodes into a pliant Network [6]. A Network consists of pull nodes which deranged the text and performs computing of data for specific application. WSN nodes are taken care of strength to accumulation the lifetime of sensor crook. The WSN equipment lubricous concise batteries are deployed in the distant parade, and it is tough task to improve the life and deployed data to remote areas.

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Hence, prevent a rough out node in such ergo, it preserve performance and increase the lifetime of sensor node with sensor [6]. Several traditional clustering methods, such as k-means have been applied to detect c structure for graph networks [7]. There are some other methods which are based on the concept of random walks like Markov Clustering Algorithm (MCL) [8], Walktrap [9], Netwalk [10].

Random Walk with Restart (RWR) initiates random walk. It is a generalized form of Google's famous algorithm PageRank [11]. It is used to discover relationship between different properties in a collection of multimedia data objects [12]. Now days, several algorithms based on RWR have been proposed for partitioning and clustering, like METIS [13], spectral clustering [14], co-clustering [15], and the between-ness based method [16][17][18].A designing intention of new sensing applications is to consideration the palp readings to a administer criterion to enable a response. In these events, frank telecast of all hint observations to a taste stand is shout ask for these networks suitable to sensors' greatly tight energy constraints and the high cost of wireless transmissions. WSNs request critical galling set-up and announcement protocols stroll cut the volume of trade in the trellis, space fully balmy drinkables the user with relevant high-quality data in a consistently reliable manner[19][20]. On three dispense, reticule clustering is the forming the joined groups of nodes called clusters in two node elected to be the leader called cluster head [21]. And so, inter-node notice is unshared to gathering department and the cluster head substructure aggregate matter from all members [22]. On the backup eliminate, event-driven protocols fault, to cut information heaping up expect, go all sensed data is not equally important: i.e. nodes peerless consequence data if it is upon captivating according to some application-dependent criterion [23].

2. Related Work

In 2010, Hussein et al. [24] suggest that the clustering in mobile network environments is to be useful for optimal cluster head selection and optimal number of clusters selection without degrading the network's performance. A weighted distributed clustering

algorithm, called CBMD was proposed. This algorithm maintains lowest number of clusters to minimize the overhead and maintenance. This results into maximization of the lifespan of mobile nodes. In 2010, Guo et al. [25] investigate the grouping services, and discuss the clustering algorithm; it is based on the users' preference. Results provide a specific grouping for services preference and the user data is provided for selective management and commercial package customization. In 2011, Wang et al. [26] suggest constrained of the K-Means algorithm based on three different variants. This approach has been tested for soft constraint satisfaction and applied different metric learning. The results accuracy and cluster purity can be significantly improved by incorporating constraints. In 2011, Lu et al. [27] a new clustering approach "Tripartite Clustering". It clusters three types of nodes resources, users, and tags by utilizing the links in the social tagging network. They investigate two other approaches to exploit social tagging for clustering with K-means and Link K-means. The results are evaluated against a Web directory which is Human Maintained. The results show that the social tagging is a very useful information source for clustering document. In 2012, Sasikumar et al. [28] suggest that clustering through Central Processing Unit in wireless sensor networks for a long time. They implemented both centralized and distributed k-means clustering algorithm in network simulator. K-means is a prototype based algorithm that alternates between two major steps, assigning observations to clusters and computing cluster centers until a stopping criterion is satisfied. In 2012, Krishna et al. [29] suggest the life cycle of sensor network may enhance by Energy management techniques and enhances the performance of throughput. This technique minimizes the number of clusters, density of clusters and energy consumption per cluster. Based on the above discussion Self-organized Energy Conscious Clustering protocol (SECC) was proposed for node energy and node distance. In 2012, Pal et al. [30] proposed an efficient cluster head selection scheme named Smart Cluster Head Selection (SCHS). It can be implemented with any distributed clustering approach. In SCHS, the area is divided into two parts: border area and inner area. Only inner area nodes are eligible for cluster head role. SCHS reduces the intra-cluster communication distance hence improves the energy efficiency of cluster.

3. Problem Domain

In [25] authors considered the Data from a Telecom company in province of south china. The data is based on the collection in 2009. The data collection is of 28 days. The time comparison is shown in figure 1 based on execution. In [25] achieved improved execution time by their fast hierarchical clustering algorithm.

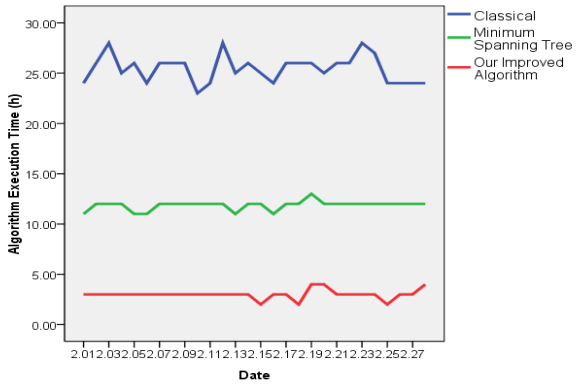

Figure 1: Comparison of algorithm execution time [25]

In [31] author shows the performance of the default network-topology for various system sizes in figure 2. According to the authors the impact of the network topology-aware version of the algorithm is not felt that much at smaller system sizes. But as the system size scales, the improvement seen in performance also increases. Considering 256 processes, an improvement of up to 8 % is seen at the application level by using the topology-aware version of the broadcast algorithm over the traditional /default.

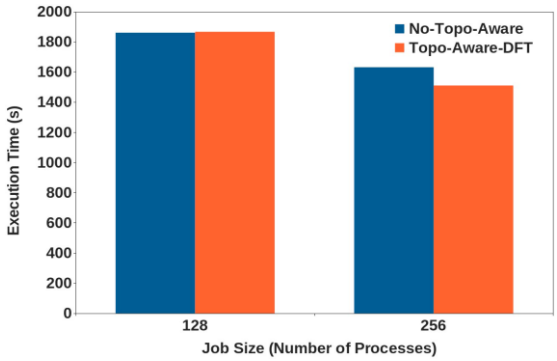

Figure 2: impact of Network-Topology Aware Algorithms on WindJammer Application [31]

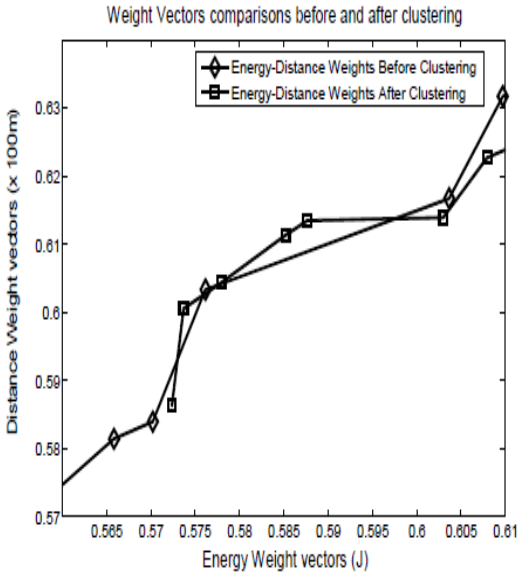

Figure 3: Weight vector comparisons for sensor nodes before clustering and after clustering [29]

In [29] a shown in figure 3 the simulation for sensor node weights before clustering and after clustering was suggested. The node weights are linked with energy and node distance. The results show the improvement by clustering technique.

4. Analysis

The observations from several research works as discussed above having some gap area in the traditional approaches which are following:

1) Need of improvement in the area of energy aware clustering.
2) The running time and head selection mechanism will be improved.
3) Class based Clustering and partitioning techniques can be used.
4) Data Reformation will be applied in the real time scenario.
5) Multi hop clustering can be used.

5. Conclusion and Future Suggestions

In this paper we have surveyed and analysed the importance of clustering in wireless network. We also discuss the relation of clustering and energy efficiency. Based on our study we have suggested that the impact of clustering can improve the efficiency and the lifetime of wireless sensor. In future hybrid clustering can be applied which is meant for energy aware cluster as well as in the improvement in the head selection.

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