A Survey on Data Aggregation in Wireless Sensor Network

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Abstract— Wireless sensor network contain no of sensor nodes. These networks have a large request in health care monitoring, security disaster management and military, etc. The sensor bumps are very trifling in size and have restricted processing capability and very low battery power. This limit of low battery power makes the sensor network lying to failure. Data collection is a very decisive technique in WSNs. Data collection benefits is the energy depletion by eliminating redundancy. This survey provides a rambling various techniques used for the purpose of data collection and its various energy-efficient uses in WSN. An encounter to data collection is how to vulnerable collected data from disclosing during collection process as well as obtain accurate collected results. In this study we converse about diverse protocols used for protected mutually data in wireless sensor network.

Key words: Data Collection, Mobile Data Gathering, Wireless Sensor Network, Mobility Control, Energy Efficiency

I. Introduction

Wireless sensor networks are spatially distributed self-sufficient sensor to observe physical or protection illness such as temperature, sound, pressure etc. The more recent complexes are bi-directional, also empowering regulator of instrument movement. The difference of wireless sensor networks was encouraged by military claims such as arena inspection which are used in a lot of consumer applications and industrial, such as residential process observing and device, machine health monitoring and soon. Sensor node data collection process is carried out to distribute the sensed data to the required point. Network lifetime and data collection latency factors are measured in the data collection process in wireless sensor network. Data collection model consumes energy uniformly across the sensing field to achieve long network lifetime. Data collection schemes are divided into three categories. They are enhanced relay routing, cluster based model and mobile collector model in enhanced relay routing data are relayed among sensor in cluster model cluster head are allowed to take the burden of data routing from sensors. Wireless Sensor Node (WSN) is a complex which covers of trivial sensor lumps that pucker statistics with sensing, computing and communication competencies. WSN is also unique class of ad hoc wireless network. Sensor nodes are deployed with narrow amount of power therefore a ordinarily employed technique of data collection is used to abate the diffusion upstairs.

II. Literature survey

A. Mobile Data Gathering with Load Balanced Clustering and Dual Data Uploading in Wireless Sensor Networks

According to Miao Zhao, Member, YuanYuan Yang, and Cong Wang [1], they are three layer structure is planned for mobile data collection in wireless sensor networks, which contains the Sensor layer, cluster head layer, and mobile collector. The structure services distributed load balanced clustering and dual data uploading. The impartial is to achieve good scalability, low data collection latency and long network lifetime. At the sensor layer, a distributed load balanced clustering (LBC) algorithm is planned for sensors to self-organize themselves into clusters. In difference to current clustering systems, our arrangement produces compound cluster heads in each cluster to balance the work load and simplify dual data uploading. At the group head layer, the inter-cluster transmission range is carefully chosen to guarantee the connectivity between the clusters. Multiple group heads within a cluster team up with each other to achieve energy saving inter-cluster infrastructures. Through intercluster communications, cluster head material is furthered to SenCar for its affecting path development. At the movable antenna layer, SenCar is prepared with two tentacles, which enables two group heads to concurrently upload data to SenCar in each time by developing multi-user multiple input and multiple-output (MU-MIMO) technique. The path development for SenCar is enhanced to fully utilize dual data uploading competence by correctly choosing polling points in each group. By visiting each designated polling point, SenCar can resourcefully collect data from cluster heads and carrying the data to the motionless data sink.

B. Joint Virtual MIMO and Data Gathering for Wireless Sensor Networks

According to Hongli Xu, Liusheng Huang, Chunming Qiao,Weichao Dai and Yu-e Sun [2],proposed the Virtual multi-input multi-output (vMIMO)) is used to achieve latitudinal diversity in wireless networks without using additional antennas. Distributed Virtual MIMO based Data Gathering (D-vMDG) algorithm is used to collect data from wireless sensor networks. Data collection is achieved with minimum energy ingestion. Data uploading complexity is high. Virtual multi-input multi-output (MIMO) or vMIMO is becoming a technology to attain latitudinal diversity in wireless networks without by additional tentacles, and to reduce control ingesting by support among multiple bulges. As data collecting is one of the most important operations in many antenna linkage applications, this paper readings energy-efficient data collecting in wireless sensor linkages using vMIMO. We explain the joint vMIMO and data collecting (vMDG) problem, which is NP hard. We also suggest a distributed method called D-vMDG as a calculation algorithm. This set of rules first concepts a tree-like topology by taking the matchless structures of vMIMO into explanation. Then, an energy-efficient defeating protocol based on dynamic software design is proposed for each node on the constructed topology. Our theoretical analysis shows that D-vMDG can complete a calculation ratio of O (1). Our simulations show that D-vMDG decreases the vitality depletion by 81 and 36 part associated to the distinguished MDT [26] and MIMO-LEACH algorithms respectively.

C. Joint Scheduling of Tasks and Messages for Energy Minimization in Interference-Aware Real-Time Sensor Networks

According to Benazir Fateh and Manimaran Govindarasu [3], proposed the Task and message scheduling operations are integrated to reduce energy consumption in WSN. Mixed Integer Linear Program (MILP) is used for the joint development of addition tasks and announcement communication in data collection tree based networks. Scheduling overhead is high in centralized scheduling scheme. Dense placements of wireless nodules and shared wireless channel pose severe interference limitations. Several scheduling patterns in works recommend interference-aware message scheduling with the neutral of vigor minimization, but the problem of joint scheduling of responsibilities and communications for energy minimization in interfering responsive manner has not been studied. We formulate a Mixed Digit Linear Program (MILP) for the joint planning of computation tasks and message in data collection tree based linkages. We propose a three phase experimental which first performs joint development of tasks and communications and then decreases the drive consumption of the network by using the dynamism exchangeable methods like Dynamic Voltage Scaling (DVS) for responsibilities and Dynamic Modulation Scaling (DMS) for communications. However, in compact placements of WSN with minor source receiver distances, DMS does not monotonically decrease the energy depletion. We use this information to competently perform slack allocation. We are current a Mixed Integer Linear Programming (MILP) preparation to obtain the optimum resolution. We evaluate the performance of the future algorithm for a change of scenarios and our results show that the dynamism savings obtained by the planned algorithm competes closely with that of the MILP result.

D. Minimizing Movement for Target Coverage and Network Connectivity in Mobile Sensor Networks

According to Zhuofan Liao, Jianxin Wang, Jiannong Cao and Geyong Min [4], proposed the system performs Mobile Sensor Deployment (MSD) and movement planning tasks to achieve target coverage and network connectivity. Clique partition and the TV-Greedy algorithm is applied to plan the sensor node movement. Sensor node failures are not considered in the system. Overage of interest points and network connectivity are two central stimulating and practically important issues of Wireless Sensor Networks (WSNs). However various lessons have exploited the mobility of sensors to improve the excellence of analysis and connectivity, little attention has been professional to the minimization of instruments' amount, which often consumes the frequent of the partial energy of antennae and thus shortens the network lifetime significantly. To plug in this opening, this paper statements the challenges of the Mobile Sensor Distribution (MSD) problem and investigates just how to organize movable sensors with minimum movement to form a WSN that offers both aim attention and network connectivity. To this end, the MSD difficult is decomposed into two sub-problems: the Target Coverage (TCOV) difficult and the Net Connectivity (NCON) problem. We then explain TCOV and NCON one by one and trust their explanations to statement the MSD problem. The NP-hardness of TCOV is proved. For a special case of TCOV someplace goals disperse from each other farther than dual of the analysis radius, an exact algorithm based on the Hungarian method is planned to find the optimal solution. For overall bags of TCOV, two heuristic algorithms, i.e., the Basic system based on clique partition and the TV-Greedy algorithm based on Verona partition of the deployment region, are future to reduce the entire measure space of sensors. For NCON, resourceful resolution based on the Steiner minimum tree with constrained control distance is recommended. The combination of the resolutions to TCOV and NCON, as demonstrated by extensive replication experiments, offers a promising solution to the unique MSD difficult that balances the load of different antennas and delays the network lifetime consequently.

E. Local Area Prediction-Based Mobile Target Tracking in Wireless Sensor Networks

According to Md Zakirul Alam Bhuiyan, Guojun Wang and Athanasios V.Vasilakos [5], proposed the distributed target tracking mechanism is used to track mobile targets in sensor networks. Target tracking (Tracking) scheme is used to achieve high Quality of Tracking (QoT) and high energy efficiency of the WSN. Target localization is not optimized. Following movable objects in wireless sensor networks (WSNs) has many central productions. As it is often the case in previous work that the quality of tracking (QoT) seriously depends on high accuracy in localization or distance assessment, which is never impeccable in practice. These bring a collective effect on tracking, e.g., target misplaced. Recovering from the effect and also set of frequent communications between nodules and a central server result in tall dynamism depletion. We scheme a following scheme, named tTracking, pointing to complete two major objects: high QoT and high energy efficiency of the WSN. We suggest a set of fully distributed tracking algorithms, which answer queries like whether an entity remains in an exact area. When objective moves across a face, the nodules of the face that are close to its estimated movements calculate the sequence of the target's arrangements and predict when the target moves to another face. The nodes answer requests from a moveable sink called the "pursuer", which follows the object along with the classification. T-Tracking has advantages completed previous effort as it reduces the reliance on needing high correctness in localization and the occurrence of connections. It also timely solves the target missing difficult caused by node disappointments, obstacles, etc., making the following healthy in a very dynamic location. We confirm its efficiency since the objectives in extensive models and in a proof-of-concept arrangement application.

F. Sensor Scheduling for Multi-Modal Confident Information Coverage in Sensor Networks

According to Xianjun Deng, Bang Wang, Wenyu Liu and Laurence T. Yang [6], proposed the Multi-modal confident information coverage (M2CIC) mechanism is used to plan multiple data sensing tasks in a sensor node. Centralized Greedy-Heuristic Algorithm (CGHA) and Distributed Greedy-Heuristic Algorithm (DGHA) are used to schedule the data capture process in sensor nodes. Connectivity and deployment factors are not focused. Network lifetime maximization with guaranteed coverage is an essential problem in wireless sensor networks. Based on our recently proposed confident information reporting (CIC) classical, this newspaper studies the multi-modal self-possessed information coverage (M2CIC) problem. Assuming that each node is prepared with changed types of sensors, the impartial is to schedule the multi-modal instruments' activity, such that the assured information coverage for each guessing modality can be sure while the system lifetime can be exploited. We model the M2CIC problem as a multi-modal set cover problem (M2SC) and show its NP-completeness. For answering the M2SC problematic, we design two energy-efficient heuristics counting a central one and a spread one. In the future algorithms, different modal devices are planned into a family of set covers, each of which can deliver confident material coverage for all the monitored physical wonders. Simulation results show that both the proposed procedures can efficiently prolong the system time and overtake two classical peer algorithms in terms of the extended system lifespan.

G. Cooperative and Active Sensing in Mobile Sensor Networks for Scalar Field Mapping

According to Hung M. La, Weihua Sheng and Jiming Chen [7], proposed the Mobile sensor movements are controlled by cooperative and active controllers. Distributed antenna fusion algorithm is used to schedule the mobile sensors. Sensor node task scheduling is not provided. Scalar field mapping has many applications with ecological monitoring, search and save, etc. In such applications, there is a need to achieve certain near of assurance regarding the estimates of the scalar field. In this paper, a supportive and vigorous sensing background is advanced to enable scalar field mapping using various mobile sensor nodes. The cooperative and active controller is considered via the realtime feedback of the detecting presentation to steer the mobile sensors to new places in order to improve the recognizing quality. During the measure of the mobile sensors, the aggregates from each sensor node and its foreigners are fused with the conforming confidences using distributed consent filters. As a result, an online map of the scalar field is built while reaching a certain level of assurance of the evaluations. We conducted processor simulations to confirm and estimate our planned algorithms.

H. Data Collection Maximization in Renewable Sensor Networks via Time-Slot Scheduling

According to Xiaojiang Ren, Weifa Liang and Wenzheng Xu, [8], proposed the system performs the data collection using the mobile sink nodes. Online distributed algorithm is used to plan the data collection and transmission operations. Single channel and node level data uploading mechanism. As sensors are driven by renewable energy sources, time-varying appearances of ambient energy sources poses great encounters in the scheme of effective routing protocols for data collection in such networks. We first devise a novel data collection expansion problem by adopting multi-rate performing transmission and data transmissions time slit planning, and show that the problem is NP-hard. We then invent an offline algorithm with a demonstrable estimate relation for the difficulty by exploiting the combinatorial property of the problem, supercilious that the harvest vigor at each lump is given and link communications in the network are reliable. We also extend the offered algorithm by minor modifications to a general case of the problem where the harvested energy at each sensor is not known in advance and link transportations are not reliable. We thirdly develop a fast, mountable online distributed algorithm for the problem in accurate sensor networks and their collected energy level. Furthermore, we also consider a different case of the problem where each node has only a fixed communication power, for which we the proposed algorithms. New results demonstrate that the proposed algorithms are resourceful and the explanations obtained are small of the optimal.

III. Problem Identification

From the above survey papers this paper studied the following problems: Mobile data collection frameworks are separated into three-layers such as sensor layer, cluster head layer and mobile collector (SenCar) layer. Mobile data collection is carried out using distributed load balanced clustering and dual data uploading (LBC-DDU) method. The data upload process utilizes multi-user multiple-input and Polling point selection is not optimized multiple-output (MU-MIMO) technique. Polling point selection and cluster head pairing operations are not integrated. Spatial coverage properties are not considered. Multiple cluster based MIMO scheduling is not provided. Finally, we would like to point out that nearby some stimulating problems that may be planned in our forthcoming work. The first difficult is how to find polling points and companionable pairs for each collection. A discretization arrangement should be developed to panel the continuous space to locate the optimum polling point for each group. Then finding the companionable pairs becomes a matching problem to achieve targets overall spatial diversity. The additional problem is how to schedule MIMO uploading from various collections. An algorithm that adjusts to the current MIMO-based communication scheduling algorithms should be considered in upcoming.

IV. Conclusion

This paper proposes a wide-ranging analysis of data combination processes in wireless sensor networks. They are used in the data collection from sensor to node and forward to base station. Competent union, routing and data collection tree construction are the three main focus areas of data combination algorithms. We have described the main structures, the advantages and disadvantages of each data collection algorithm. By using data collection techniques performance measures such as, data latency, data accuracy, energy consumption and network lifetime problems are resolved. Well-organized organization, routing, and data collection construction are the three main focus areas of data collection algorithms.

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