High Speed Data Transmission in Efficient Aggregation Scheduling based Multihop Wireless Sensor Network

Vinod Kumar Menaria[1], Bhavna Bundel[1], C.M. Choudhary[1], S.C. Jain[2]
Department of Computer Science and Engineering
[1] Swami Keshvanand Institute of Technology Management & Gramothan, Jaipur, [2] Rajasthan Technical University, Kota
Email: vinodkrmenaria@gmail.com

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Abstract: **A wireless sensor network (WSN), sometimes referred as WSAN, wireless sensor and actuator network [1]. WSANs[1] are used to monitor environmental or physical parameters like pressure, temperature, sound etc. WSANs are independent sensors allotted spatially and monitors the aforesaid terms [2],and transfers datacooperatively through the network to a main gateway. In Wireless Sensor Network, Time Slot to Transmit is an important point for Data in between Different branches of Tree (T). This paper presents a Compressive Improved Aggregation Scheduling algorithm (CIAS) and comparison between CIAS, IAS (Improved Aggregation Scheduling) and DAS (Distributed Aggregation Scheduling) algorithms [3]. The main area of discussion is low TST (Time Slot to Transmit) which provides fast data communication.**

Key Words: **WSN, aggregation scheduling, SINR,delay, IAS, DAS.**

1. INTRODUCTION

A wireless sensor network (WSN) [1] works for tiny sized and low-powered sensor nodes which covers a complete geographical area. Sensor nodes communicates to each other for controlled application programs. In every application of WSN, there is a control center [2] where a user can inquiry on sensors data within the network. The control centers, accepting much computational ability as compare to another wireless node. It requires collecting sensors data by the network. In the process of data collection, information get compressed in the network to save energy. In Data aggregation [3-5], data are collected and extracted in a summary form as few aggregation operators are available such as maximum, sum etc. In contrary to raw data collection, data aggregation can provide a new energy efficient or time efficient technique for gathering data.

Generally in most of control applications, the time of utilizing the information is crucial and along with a data aggregation task includes a rigorous delay constraint. Data aggregation delay is the time interval when data is sent by the first sensor node and aggregated information is received by control center. One of the best method is being used for delay minimization is enhancing the throughput, though wireless interference is the key challenge while transferring data in WSN. Previous work mainly focused on interference models based on the graph which elaborates protocol design for data aggregation. Graph based models provides protocol designing and improves efficiency but these models cannot imitate the overlapping impact of wireless obstruction. Though, the obstruction from a single sensor node may be comparatively smaller but the aggregated interference from multiple sensor nodes can be adequately high to corrupt or vanish the data transmission to some extent. Furthermore, models based on graph tend to ignore hindrance beyond some extent and they are merely obstruction models. Beyond this, the physical model [6-7] gives the exact picture of wireless intermeddling. If the threshold value prescribed by the hardware remains below SINR (signal to interference-plus noise ratio) [8], the signal is retrieved appropriately. The interference produced by far off transmitters are proven in this explanation and it can obtain more precise interference between transceivers. A complete care of overlapping interference is required to aggregate information through SINR restraints. Assuring that all operating components fulfill the SINR restraints is made difficult by the impact of probable obstructions from the distant nodes. Moreover, the consideration of an obstruction edge is not a paired relation.

The reliance of SINR at every receiver end on transference are getting regular in each time interval simultaneously. As interference graph is a hyper graph, it cannot be formed unless the solution is known in advance. Hence, the algorithmic analysis is made difficult as compared to the models based on graph. In this paper we discuss about SINR restraints based on delay efficient information aggregation scheduling.A set of wireless sensor nodes scattered in a region is taken as input. Every node carries some information to be reported. Our goal is to construct routing and transference procedure for collecting the information with SINR restraints.

2. DATA AGGREGATION SCHEDULING ALGORITHMS

A.Distributed Aggregation Scheduling [3]

In the starting, we spread the plane into cell or nodes of Routing Tree T. In Routing Tree T all node is defined by [μ]. In the Tree T, node [μ] determines the type [μ] and level by Level[μ] in the

Routing Tree T. All nodes [μ] have the child node that is defined by NOC [μ].

Algorithm 1. Distributed Aggregation Scheduling [3]

Input: Number of Nodes, Parameters of the Network.

Output: TST (Time Slot to Transmit)

T Routing Tree

Type [μ] Type of node in the Routing Tree

L Leaf Node

D Dominator Node

C Connector node

Level [μ] Position/Level of the node

Color[μ] shows the Grid Color of the μ node.

Number of Child [NOC] children node for the Parent node [μ] in Routing Tree T.

1. Distribute the cells into the selected plane.
2. Every Node cell in the Tree T is showing by [μ].
3. The type of node or cell is defined by type [μ] and level by Level [μ].
4. Every Dominator sends the data to the {1,2,...,NOC[μ]} in tree T.
5. If μ node is a dominator then
   $TST[u] = \Delta.K^2 + 16K^2.Level[\mu] + K^2.(N+3) + Color[\mu]$
6. If μ is a connector then
   $TST[\mu] = \Delta.K^2 + 16K^2.Level[\mu] + K^2.(N+3) + Color[\mu]$
7. Every node μ transmit the Data at TST [μ].

B. Improved Aggregation Scheduling

In the Improved Aggregation Scheduling method, A Routing Tree T is planned by the collection of the Dominator and Collector Nodes. The range of the network is between 200 to 2000m.

Algorithm 2. Improved Aggregation Scheduling

Input: Number of Nodes, Parameters of the Network

Output: TST (Time Slot to Transmit)

T Routing Tree

Type [μ] Type of node in the Routing Tree

L Leaf Node

D Dominator Node

C Connector node

Level [μ] Position/Level of the node

Color[μ] shows the Grid Color of the μ node.

Number of Child [NOC] children node for the Parent node [μ] in Routing Tree T.

1. Distribute the cells into the selected plane.
2. Every Node cell in the Tree T is showing by [μ].
3. The type of node or cell is defined by type [μ] and level by Level [μ].
4. Distribute the nodes in the range {1, 2,.........., $(K+3)^2$}. K is a constant parameter.
5. If a leaf Node can receive node N then
   $TST[\mu] = (N-1). K^2 + Color[\mu]$
6. If a node μ receive a number N then condition of TST for dominator and Connector.
7. If μ is a Dominator then
   $TST[\mu] = \Delta.K^2+16K^2. Level[\mu] + K^2(N-1) + Color[\mu]$
8. If μ is a connector then
   $TST[\mu] = \Delta.K^2 + 16K^2. Level[\mu] + K^2 (N+3) + Color[\mu]$
9. Every Node μ will transmit the data at TST[μ].

3. PROPOSED METHODLOGY

In proposed methodology, we are reducing the number of sensor nodes in the design network. Using this technique, the number of sensor nodes are applying from 1, 2.......... $(K-1)^2$. As we decrease the number of sensor nodes of the network, the total transmitting time will also reduce as it is a functionality of the sensor nodes. As the total transference time for the sensor nodes will reduce, the delay for the total transmission network will also get reduced.

Algorithm3. Compressive Improved AggregationScheduling

Input: Number of Nodes, Parameters of the Network

Output: TST (Time Slot to Transmit)

T Routing Tree

Type [μ] Type of node in the Routing Tree

L Leaf Node

D Dominator Node

C Connector node

Level [μ] Position/Level of the node

Color[μ] shows the Grid Color of the μ node.

Number of Child [NOC] children node for the Parent node [μ] in Routing Tree T.

1. Distribute the cells into the selected plane.
2. Every Node cell in the Tree T is showing by [μ].
3. The type of node or cell is defined by type [μ] and level by Level [μ].
4. Distribute the nodes in the range {1,2,.....,$(K-1)^2$}. K is a constant parameter.
5. Design a Routing tree, in which L indicate the Leaf node, D represent the Dominator and C represent the connector of the routing tree.
6. Select the nodes in distance j = 1, 2,.....,$(K-1)^2$ in Routing Tree.
7. i define the location of the Level[μ] node in routing tree T.

8. If μ is the dominator then, μ transmit at the Time Slot $TST[\mu] = (K-1)^2 * (2 * (R-i)) + \sigma_g$
9. If μ is the Connector then , μ transmit at Time Slot $TST[\mu] = (K-1)^2 * (2(R-i) + 1) + \sigma_g$

4. RESULTS

For designing the Wireless Sensor Network based Data Aggregation, assure the latency/delay of the IAS (Improved Aggregation Scheduling) algorithm and CIAS (Compressive Improved Scheduling Algorithm) for display the delay of the designing network.

In Figure 1, demonstrate the latency/delay functioning for the DAS algorithm, IAS Algorithm, and CIAS Algorithm. In Figure 1, the range of the network size is 500m* 500m and modifies the maximum node degree (Δ). Radius R of the system is also unchanged.

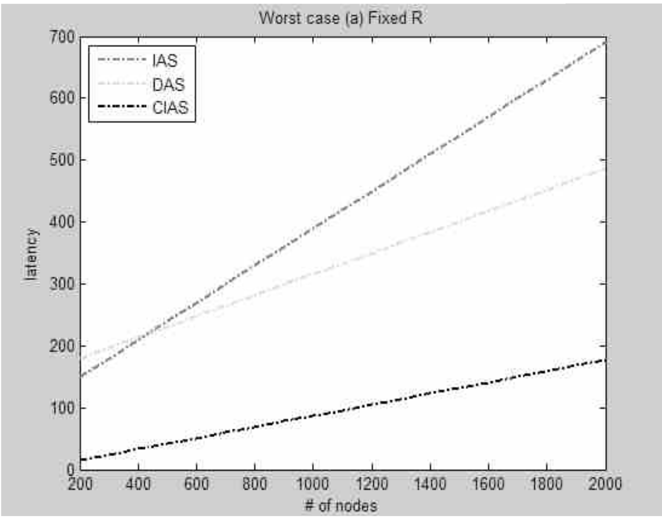

Fig 1. Latency comparison for Fixed Network Radius(R)

As Figure 1, is presenting the latency/delay for the limited size of the network. Delay of the CIAS is small in comparison to DAS and IAS techniques. In Figure 1, the graphs are plotted in between latency and number of nodes because the size of the network is unchanged while the number of sensor nodes in the network is getting changed.

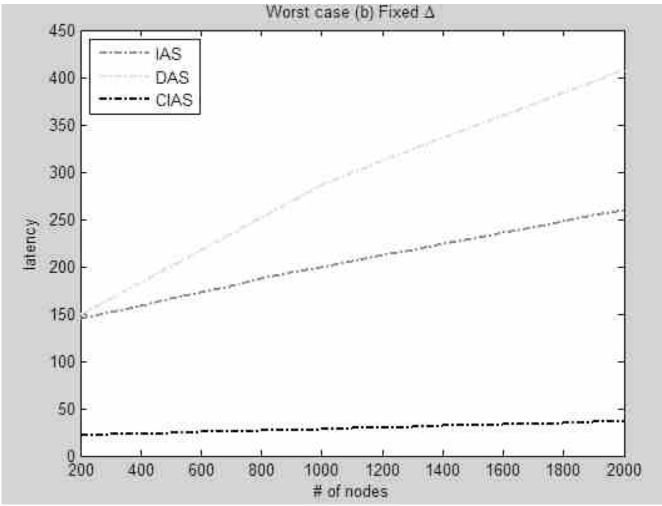

Fig 2. Latency comparison for fixed maximum node degree (Δ)

Figure 2 presents the results for the fixed maximum node of degree (Δ while varying the Network radius (R). The value of the (Δ) is unchanged and it near about 25 while the Network Radius (R) is increasing continually. The size of the network is unchanged, and it is 500 m * 500m. As the figure is presenting, that the Latency of the Compressive Improved Aggregation Scheduling(CIAS) Algorithm is low as compare to DAS and IAS methods.

5. CONLUSION AND FUTURE SCOPE

The delay efficient aggregation scheduling algorithm termed as CIAS is proposed under physical interference model in WSNs. In this Paper, TST for the Dominator and Connector Nodes is reduced hence, latency of the network get reduced.

Today a lots of different type of attacks on WSNs are possible and those attacks can stole the data and can alter the data. Hence, as a future work, various security mechanism can be applied to the sensor networks to prevent different kind of attacks on WSN.

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