A COMPARATIVE ANALYSIS FOR SENSOR FUSION IN DISTRIBUTED SENSOR NETWORKS: A REVIEW

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Abstract: Wireless Sensor Network technology has been a standout amongst the most transforming and gives power to technologies recent year. Sensor node collects all sensed data and sends to the sink node in wireless sensor network. The situation of the sink hub has a huge effect the energy utilization and lifetime of WSNs. All collected data transmitted in wireless sensor network from one node to another node communicate to the sink node. Data aggregation is an outstanding methodology in WSN and it is a process of gathering and aggregating the information from various sensors to give joined data to the base station. These processes repeat much time collecting these data efficiently that reduce the energy consumption of data transmission in wireless sensor networks. In wireless sensor network, different data aggregation approach is used for data aggregation. In this paper, we study much paper regarding enhance the lifetime of the sensor and reduce the energy consumption in a wireless sensor network. Overall apply many data aggregation algorithm are used in WSNs it helps to reduce the energy consumption and increase the lifetime of WSNs.

IndexTerms-Wireless Sensor Networks; Data Aggregation; Energy Preservation; WSN

I. INTRODUCTION

Now a day Wireless Sensor Networks (WSNs) used every place industry, vehicle mobile, etc. Day by day uses of Wireless Sensor Networks (WSNs) increase over a few years back. Wireless Sensor Networks is used in the application such as Air pollution monitoring, Water quality monitoring, Weather monitoring, and speed of the vehicle. The Wireless Sensor Networks are framework less network and contain little sensor nodes which measure temperature, weight, light force, and so forth. These sensor nodes are light weighted and low powered. Sensor nodes have information detecting and handling abilities and pass on these data to the sink. The sensor nodes set up in the various location, gather the data and routes to the sink node. A lot of energy is consumed during transmitting, getting and processing of the sensed data. In the event that any of the nodes fails it will influence the network topology. So as opposed to sending every one of the data packets straightforwardly to the base station, it is smarter to consolidate the data packets. This should be possible by presenting an intermediate node. Intermediate node collect all sensed data from the sensor node and aggregate the sensed data and transmitted to the base station. A lot of weight on a node during the transmission of the data from one node to another node. That time the sensor node consumed a lot of energy and decrease the lifetime of the sensor nodes. In Wireless Sensor Networks data aggregation techniques can be utilized to gather the data by decreasing the number of transmissions to the base stations. Because reducing the number of transmission time in wireless sensor networks (WSNs) reduce energy consumption and increase the lifetime of the sensor nodes[1].

I.I DATA AGGREGATION

Data aggregation approach is the main technique utilized in WSN for gathering and aggregating data from sensor nodes. The principle objective of data aggregation algorithm is to gather and aggregate data so as to enhance the network lifetime. In WSN, Data Aggregation reduces the measure of network traffic which decreases energy consumption on sensor nodes and furthermore expanding the network lifetime. It can be involved as the process in order to achieve aggregating the data from various sensor nodes which is provide the fusion data to the base station so as remove the redundant transmission. It is the process aggregating the sensed data by utilizing different aggregation approach. The data aggregation methodology improves the two factors, for example, Energy consumption and lifetime of the wireless sensor network.

A. Factor in data aggregation

There is some following factor which is involved in data aggregation. Approach.

1. Energy consumption

By utilizing the data aggregation in the sensor network the energy utilization gets decrease. Without the aggregating, the gathered data from sensor nodes can cause higher energy utility for moving the data to the sink. Henceforth data aggregation in WSN helps in the energy efficiency of data transferring.

2. Lifetime of network

In spite of the fact that the energy utilization in the network can be minimized subsequently the network lifetime get expanded. Thus Network Lifetime gets simply relies upon energy consumption [5].

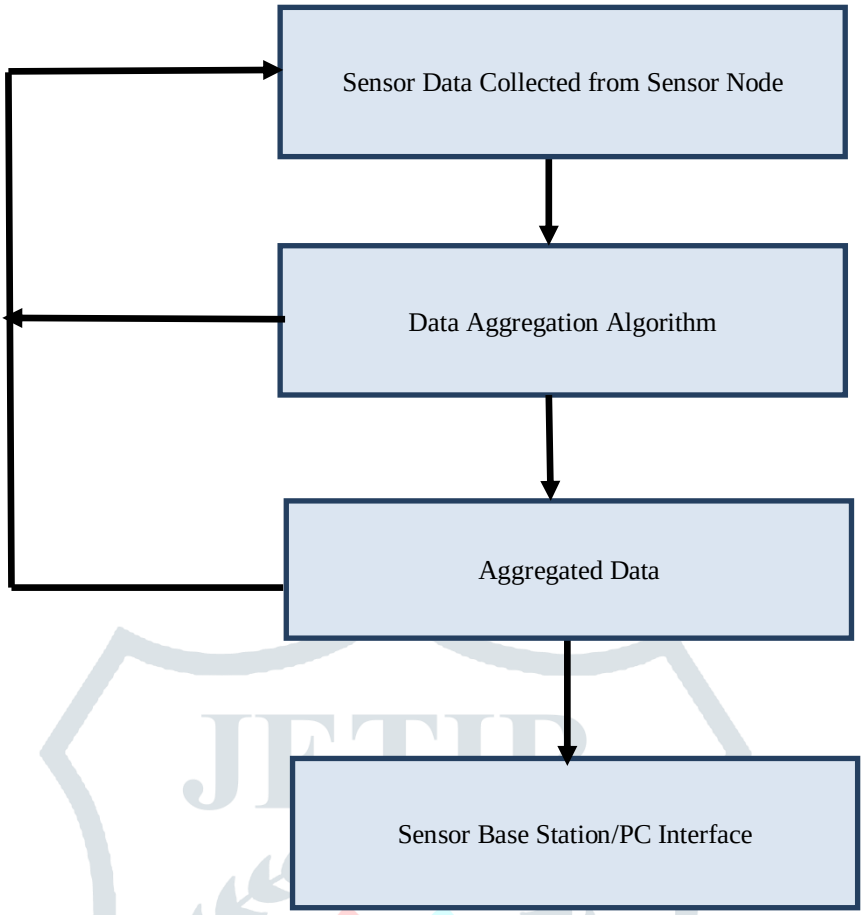

Fig 1. Data Aggregation Architecture [5]

I.II TYPE OF DATA AGGREGATION

There are various types of data aggregation techniques, for example, structured, structure-less and different kinds of network.

A. Structured Data Aggregation

The structured aggregation requires an explicit structure for performing data aggregation.

B. Structured-less Data Aggregation

In Structure-Less Data Aggregation does not require any structure. Structured network architecture incorporates flat networks, hierarchical network and so on.

In Hierarchical based data aggregation, data aggregation is done in the middle of the road nodes before transmitting to the base station. Cluster network and tree network includes in the hierarchical networks.

In Cluster-Based data aggregation entire network is isolated into various clusters. The cluster has a head node. The head node aggregates the detected data from the nodes which are inside the clusters.

In Tree-Based Data Aggregation, all nodes are sorted out in the kind of a tree. The moderate nodes go about as aggregators and collect sensed data from leaf nodes and transmit to the root node that is the sink node.

In Location based methodology, the situation of every sensor node is recognized based on the location. The nodes area can be recognized by checking the incoming signal strength or by utilizing the Global Positioning System[1].

Table 1: Comparison of Data Aggregation Approaches

Network type	Advantage	Limitation
Structure-less	There is no requirement for the reconstruction of the structure When any node fails.	Tough in making on routing choices and performing aggregation
Cluster and Tree	Energy consumption could be reduced.	Recovery of nodes is tough
Tree	Power consumption is less, During data transmission in networks	The disappointment of the intermediate node influences the topology

I.III ADVANTAGE OF DATA AGGREGATION

- By utilizing data aggregation in WSN the robustness and accuracy of data get improved.
- Data aggregation helps to reduce the traffic load of the network.
- It limits energy consumption.
- It expands the Network lifetime[5].

II. LITERATURE SURVEY

In this paper [1] The author introduces energy efficient tree-based data aggregation technique in a wireless sensor network is talked about. In tree architecture, all nodes are organized as a tree containing leaf nodes and sending node This structure can be adjusted for continuous observing applications. Power Consumption is less during data transmission in a tree-based aggregation. All nodes are organized as the tree. The middle of the road node assembles and aggregate data which is sensed by the sensor nodes and transmits to the base station. By using this method decreases the energy consumption and enhance the lifetime of the networks. It used less power consumption during data transmission in tree-based data aggregation. Data aggregation is a technique which is used to collect the data by reducing the number of transmission to the sink node. During data aggregation every single redundant data or node removed. Therefore, the measure of data is sent to the base station is less, which diminishes the energy consumption at every node.

In this paper [2] The author defines the data aggregation problem in WSNs with multiple sinks, and introduce the two data aggregation algorithm for Wireless Sensor Network with multiple sinks which are minimized the number of data packet transmissions during data collection. The first algorithm based on a Minimum Spanning Tree algorithm and the second algorithm based on Shortest Path Tree algorithm. We have assessed them in networks of sizes 100, 200, 300, 400, 500, and 1000 nodes. The nodes randomly arranged in a zone of size 100 mx100 m. The correspondence range was set to 25 meters. SPT is simulated in a two way. i) the super virtual sink is chosen randomly and ii) the super virtual sink is chosen from the nodes around the focal point of the zone. A WSN can be more trustworthy that it is arranged with more than one sink. Existing data aggregation protocols have been produced for WSNs with a single sink, or those protocols aggregation data towards just one sink. Our algorithms attempt to limit the quantity of redundant data packet transmissions by giving just a couple of nodes a chance to transmit more than once. The simulation results demonstrated that our algorithms take care of the data aggregation issue with few packet transmissions

In this paper [3] The author introduces we use radar and vision sensors for exact object acknowledgment. Notwithstanding, since sensor explicit data have various directions, the data coordinate adjust is basic. We present the coordinate adjustment algorithm among radar and vision pictures and perform sensor aligning utilizing data got from real sensors. There are extraordinary research efforts and interests in the field of the intelligent transportation system (ITS). ITS upgrades driver well-being and accommodation and are being commercialized as intelligent vehicle and advance driver assistance System (ADAS). The initial phase in intelligent vehicles and advanced driver assistance systems is to understand nature through street vehicle location and following. In light of natural conditions, reaction cruise control systems, front vehicle collision warning and impact moderation systems, and a person on foot collision warning systems have just been commercialized. we present the usage of radar and vision sensors to improve the object recognition in a vehicle encompassing. A coordinate calibration technique was utilized to at the same time process the data of the radar and vision sensor utilized for parallel rearward checking of the autonomous vehicle. The static target radar target data and vision target data got from the real experiment. In the experiment, the objective data is represented to by one point. Be that as it may, since the real target is a vehicle or an object, it must be communicated as an area, not a point. On the off chance that the calculate accuracy is about 95%, the adjusting result is reliable.

In this paper [4] the author proposes an algorithm, in which a few nodes are chosen as reinforcement nodes dependent on their energy during the network deployment stage. Reinforcement node replaces the cluster head when its energy achieves a threshold. We additionally guarantee that the cluster head isn't replaced by a malicious node. Clustering is a method in wireless Sensor network which is utilized to keep up the energy of the nodes efficiently with the goal that the lifetime of the network can be drawn out. In many clustering algorithms, selection of a cluster head is done dynamically dependent on its remaining energy and separation from the base station. The proposed EECSB algorithm and the current clustering schedule. The performance was assessed to figure out the adjustments in parameters, during the election of a new cluster head. Reproduction results demonstrated that the EECSB algorithm out plays out the current model as far as energy, delay, and throughput Overall by using this algorithm increases the energy efficiency and lifetime of the networks.

In this paper [5] the author introduces the data aggregation approach which increases the lifetime of the wireless sensor networks. The proposed algorithms, for example, Angular Query Region Division Routing Algorithm In Angular algorithm data aggregation protocol are utilized for sensing and gathering the data. This algorithms center around two issues, for example, lifetime extension and energy utilization. This algorithm relies upon tree-based data aggregation methodology. In this algorithm, if client infuses the query into the network, the network gets isolated and one node is chosen as an aggregation node then the process gets begins. First, we have divided the area of the networks by passing the query. After that distributing the query message the sink node passed the message to its close neighborhood nodes of each query in the sub-region of the networks. In the constructing routing tree node selection process involve for aggregation. After that, we are collecting sensor reading, we are collecting all aggregate data from the hole corresponding node and its perform aggregation approach. In WSN, data aggregation is the most vital method for gathering the data from sensor nodes. By utilizing data aggregation the energy utility for moving the data to the sink gets limited. The tree-based data aggregation is valuable in limiting energy utilization since it finds the shortest path between the leaf node and the root node. Consequently, the lifetime of the network gets expanded.

In this paper [6] the author proposed a framework for aggregation for wireless sensor network dependent on heuristic tree formation with a realistic assumption for detecting need and distributed nature. So the proposed aggregation tree is named, Semi Distributed Heuristic Energy effective Aggregation Tree algorithm for wireless sensor networks (SDHEAT). In light of Simulation results, we present a detailed analysis of the Residual energy, lifetime and end to end delay in correlation with two heuristic algorithms considered as of now for data aggregation in WSN specifically, AEESPAN as a source based tree aggregation and Virtual Force Data Aggregation (VFG) as a free topology aggregation strategy. The proposed algorithm is source free aggregation protocol. The tree is made through the network field by a semi-distributed way that relies upon best first search technique. The proposed aggregation strategy works in two stages, in the first stage, the formation of the tree; the tree is begun at the sink node as root and developed by the best first search technique. Simulation results have exhibited that our technique has a decent performance contrasted and the related strategies as far as delay, residual energy. The work is stretched out to propose a framework for IoT network design.

In this paper [7] the author introduces data fusion algorithm FTDA dependent on the time forecast model is proposed in perspective on the issues of scalability of the forecast model and the capacity to proactively recognize data redundancy. That algorithm broadens the lifetime of the sensor network and expands energy utilization. Proposes data aggregation algorithm called FTDA (Time Forecast Algorithm of Data Aggregation) in light of time arrangement expectation. The network topology is partitioned into three sections: a wireless sensor network node, a cluster head, and a base station. The exponential smoothing expectation model is utilized in wireless network nodes and cluster heads individually. Nodes in the network have a similar energy, and nodes in the network use clock synchronization to move data. The FTDA algorithm is segregate into three stages, specifically, cluster selection, cluster formation, and data transmission. The exponential smoothing forecast model assumes a prescient job in the data transmission phase. Overall the performance of the FTDA algorithm increases 30% of the network life cycle it diminishes the energy utilization of the wireless sensor network with the assistance of the data aggregation algorithm (FTDA).

In this paper [8] the author presents a strategy for target following and localization for surveillance vehicle with visual-inactivity sensor-fusion utilizing extended Kalman Filter (EKF). In this application, the visual data is gotten utilizing rotating camera and laser run discoverer. The visual data are utilized to for use inertial measuring unit (IMU) in the determination of position and velocity of the observation vehicle and furthermore used to decide the position and velocity of the objective which is moving regarding the moving surveillance vehicle. EKF is utilized as state estimator to describe the position and velocity of the observation vehicle from the loud, multi-rate estimations given by the sensing system. Improve the localizing of the superintendence by utilizing sensor fusion. A strategy for visual-IMU-fusion based localization and following for an observation application is displayed. The feasibility of localization and target following utilizing EKF Visual-IMU fusion is watched. The simulation result demonstrates the improvement of restriction execution from the IMU-alone system. The improvement of restriction execution relies upon the speed of vehicle and update rate of visual data. For a rapid vehicle, the visual update rate of 1 Hz with single landmark slightly improves the restriction. For target following, it is seen that the current tightly-coupling EKF channel shows initiated mistake during the following task.

In this paper [9] the author present and analyze down an energy efficient data compression and data aggregation algorithm which results in the entire network lifetime delayed by about 24 %. In this paper, another thought is proposed for sensor values compression dependent on a strategy that includes an input mechanism. In this method, the base node in the sensor network produces Huffman code for the sensor data that should be compressed and communicate the Huffman code into the sensor network. All nodes in the sensor network get Huffman code, compress the sensor data and transmit to the base node. For data aggregation, secure data aggregation algorithm is utilized which does not require an extra stage for data integrity verification and furthermore, it escapes additional transmissions and computational overhead on the sensor nodes to lessen the measure of energy spent by the network. So as to demonstrate the supremacy of our methodology, a correlation study was made with the current aggregation algorithms as far as the lifetime of the sensor network. Additionally, Modified elliptic curve digital signature algorithm is utilized for data aggregation. Also, improve energy consumption.

In this paper [10] the author proposed a layered efficient data aggregation plan dependent on the compressed area is exhibited and executed to implement the issue of too much high measure of data transmission and extreme energy utilization in wireless sensor networks. Sensor network is designed and their nodes are organized in a chain of command of the multistage cluster. On this structure, gathering clustering in various levels play out the compressed inspecting and transmit the compressed data to their parent clusters. At that point, the data fusion dependent on the compressed area is completed by the parent gathering cluster and the data is kept on being sent to the upper layer, until the top cluster head node is come to, and the last data is recovered. The exploration and analysis demonstrate that the proposed algorithm has better execution in measure of data being moved and energy utilization.

In this paper [11] the author proposes an energy-effective system in which data accumulation nodes are used for collecting data from a cluster head inside the cluster. Improved the lifetime of the wireless network by sending the data in aggregation position. We discover the attack node just as cluster head. The network life just as exactness of then network is expanded just as warding off attackers from the system by utilizing the proposed system. At the point when any invalid data is perceived by the system, it recognizes the attacker who contains pernicious data in each cluster which is gotten to by attacker just as limits the assailant's data and just confirmed data is sent to the sink node. The system improves just as limits the network lifetime and energy utilization at the season of data transmission respectively. We did experiments on the system and exploratory results demonstrate that the proposed attack strong system is effectively preserved 83% of energy as compared and the past system just as uses least energy as compared and past system. Also, our novel system effectively upgrades the presentation of the system just as an increment in the accuracy of data transmission.

In this paper [12] the examination paper, an algorithm has proposed for improving the lifetime of WSN working which records for less energy utilization for the system. The author has seen that there are issues in routing way discovery process and data accumulation in WSN. These issues happen in light of the energetic and self-starting nature of nodes. Compressive data Aggregation and effective data accumulations are the normal issues related to wireless sensor network; such a large number of methodologies have been made and proposed for the energy efficient technology in WSN. we have proposed a stage towards efficient data Aggregation by creating a system that computes the base separation between two nodes and least energy utilization from the batteries deployed in the field which helps in expanding the battery life as well as gives safety to sensor nodes from overabundance power.

III. CONCLUSION

We are studying many papers in the literature survey. In wireless sensor networks(WSNs) data aggregation assumes a significant job in light of the fact that in wireless sensor network numerous sensors are included. Every sensor consumed a lot of energy and decrease the lifetime of the sensor. During data transfer, every node has a lot of weight of traffic in the networks so that transmission time also increases. Data aggregation one of the best approaches for data aggregation in wireless sensor networks(WSNs).Data aggregation algorithm help to remove the data redundancy of sensed data of the nodes and also used for extending the lifetime of wireless sensor networks reduce the energy consumption of the networks.

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