

# Review of Data Mining In WSN

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**Abstract:** Current years have witnessed the emergence of wireless sensor networks (WSNs) as a new information-gathering paradigm, in which a large number of sensors scatter over an examination field and extract data of interests by reading real-world phenomena from the physical environment. Energy consumption becomes a primary concern in a WSN, as it is crucial for the network to functionally operate for an probable period of time. The WSN's extraordinary characteristics direct us to innovative research challenges in some data mining process. Data mining is one of the most important methods by which useful patterns in data with minimal user interference are known and available information of users and analysts to make decisions relayed on their vital organizations to adopt. Data mining, as the continuance of multiple intertwined disciplines, consisting statistics, machine learning, pattern recognition, database systems, information retrieval, World-Wide Web, visualization, and lots of application domains, has made great progress in the past decade. To ensure that the advances of data mining research and technology will competently benefit the progress of science and engineering, it is important to scrutinize the challenges on data mining posed in data-intensive science and engineering and explore how to further develop the technology to assist new discoveries and advances in science and engineering. In WSNs, hierarchical network structures have the advantage of supplying scalable and energy efficient solutions.

**Keywords:** WSN, Partitioned WSN, Scheduling in WSN, Location-Based Scheduling, Data Mining.

## 1. INTRODUCTION

### 1.1 Introduction to WSN

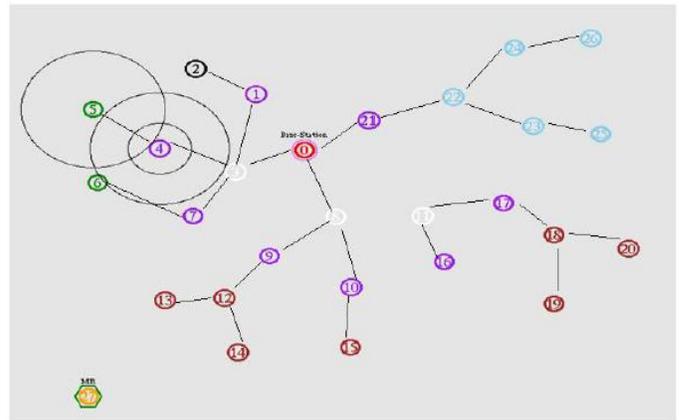
Wireless Sensor Networks (WSNs) mechanism is rather simply applicable to a variety of fields. It is based on smaller nodes, radio transceiver, and battery. The wireless sensor networks execute function in autonomous manner in the spatial field to get accurate values. Wireless Sensor Networks (WSNs) are a moderately new application in the network which provides high quality monitoring for great geographical areas with relatively inexpensive equipment [1]. WSNs are composed of set of tiny sensor nodes, which can effectively monitor their adjacent environment. Due to the wide potential applications in battlefield surveillance, environmental monitoring, healthcare, weather forecasting, and disaster detection etc WSNs have attracted quite attention from both academic and industrial fields in current years [2] WSN have a numerous advantages, but the available energy at each sensor nodes are treated as a restriction. Hence energy consumption is a major criterion [3].

### 1.2 Partitioned WSN

The sensor network scenario with tree based topology which having one sink node/ base station with four parent nodes. every

parent node having link to one or more child nodes as shown in figure 1.

In the figure below Node 0 is sink node and parent node are 3, 8, 11, and 21. Their corresponding child nodes are shown through the link as shown in Fig 1. Consider power of node 11 is drain off entirely which result in partitioned WSN, node 11, 16, 17, 18, 19 and 20 are pack of sensor nodes in divided WSNs. In partitioned network sensed data from other nodes are transitory collected by earlier node of the parent node. Past mobile robot visit the parent node, MR gets the gathering information from that pervious node of parent node in partitioned system. For example consider partitioned network nodes 11, 16, 17, 18, 19 and 20. In this node 11 is dull node. So, sensed data from 17, 18, 19 and 20 nodes are transitory collected by node 16 which is previous node of the parent node. Past mobile robot visit the node 11, MR gets the assembled information from node 16 in that partitioned network [1].



**Fig.1: Example of tree based WSN [1]**

### 1.3 Scheduling in WSN

#### A. Time-Based Scheduling

(TBS) Time-based scheduling is based on the time a node becomes the status of death node and near death node. Fig. 1 shows that nodes 3, 8, and 11 are denoted as death node and the values of Death time for every node are in the order of node 8 < node 3 < node 11. Allowing for above death time of parent nodes, node 8 is first lost node or going to dead node (close to death node) before node 3 and node 11. So, the mobile robot call node 8 first and then MR visit node 3 and node 11 for data gathering method.

#### B. Location-Based Scheduling

In most situations, the distance among the death node and the sink of the WSN is measured. Thus, location based scheduling (LBS), based on the distance amid the sink and the death node and near death node, is necessary. LBS is set to command the MR to visit the nearest the death node and near death node first to collect necessary information. The Euclidean distance formula calculates the distance among the sink and the location of the death node and near death node. For example, distance among sink and the dead node/near dead node as follows. Fig. 2 shows that the distances of nodes 3, 8 and 11 linking the sink are in the sort of distance (3) < distance (8) < distance (11). Node 3 is few distance to the sink, when comparing distance among parent node and sink. So, the mobile robot visit node 3 first and then MR call node 8 and node 11 for data gathering process [1].

#### 1.4 Data Mining

The rapid development of computer and information technology in the last twenty years has fundamentally changed roughly every field in science and engineering, transforming many disciplines from data-poor to progressively data-rich and calling for the improvement of new, data-intensive methods to conduct research in science and engineering [4]. Data mining is one of the most imperative methods by which useful patterns in data with minimal user intervention are known and accessible information of users and analysts to make decisions based on their vital organizations to adopt. Half-term data mining process involuntarily analyze large databases to find useful patterns can be applied.

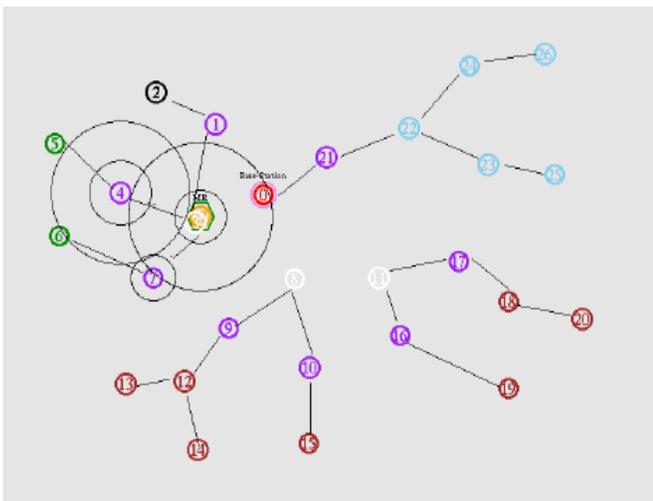


Fig.2. Example of Location based scheduling [1]

Data mining is the process involves three steps are: 1. Initial excavation, 2. Construction sculpts or gain credit with the help of pattern recognition / approval, 3. Operation, Step 1: search. Usually this order with facts preparation will be done which may include data cleansing, data conversion and election the sub-set of fields is with enormous volume of variable (fields). Then according to nature analytical predictions, this order to precaution model simple or comments to recognize variables and determine the complexity of models for use in the next step

requires. Step 2: Production and verification of model validity. This stage to review different models and selecting the best model predicting the competence of the deals. Several techniques were developed to achieve this aim. And "competitive estimation of models" was called. For this purpose different models used identical data collection until be compared their competence, then the model that have the best performance, is chosen. This technique include: Bagging, Boosting, Stacking and Meta-learning. Step 3: utilize. Last step before a model that has been selected, the work in new data until expectant's precaution outs [6].

#### 1.4.1 Cluster analysis in data mining

The process of clustering the facts objects into cluster is depended on the similarities and their functionalities is data clustering. This process is much easier to collect and dissimilar sensors are placed in the nearby clusters. The Difference between the clusters is dependent on the characteristics of every cluster and they are measured by various distance functions like Manhattan distance and Euclidean distance [5].

## 2. LITERATURE SURVEY

**V. Karthik in 2012[1].** The projected data collection method involves deployment of multiple mobile robots whose responsibility is to gather the data from the nodes whose energy is below the threshold value. In projected hybrid scheduling, the navigation of mobile robots scheduled by both the combination of time and location based approaches with various region scheduling. In large network scenario, the mobile robot gets more burdens due to its extra responsibilities to visit all partitioned nodes. Therefore, the efficiency of sensed data improved doubly using multiple mobile robots. Through simulation below the environment of NS-2 simulator, the results from various aspects show that proposed multiple mobile robots can develop the performance of collecting the sensed data in large-scale sensing fields and also it improves the lifetime of the sensor nodes.

**M. Vijayalakshmi et al.in 2013[2]** WSNs usually consist of a large number of small sensor nodes with limited on board energy supply and deployed densely in a given region for information harvesting purposes. the power consumption in WSN becomes as a major issue now a days. Proposed framework is clustering based. Clustering and Prediction techniques, which use temporal correlation among the sensor data, supply a chance for reducing the energy consumption of continuous sensor data collection. Thus it can attain stability and prolongs network lifetime. An adaptive scheme is presented which is used to control prediction, analyze the performance tradeoff between reducing communication cost and prediction cost, and design algorithms to take the benefit of adaptive scheme to enable/disable prediction operations. Localized prediction scheme is performed which takes advantages over the previous dual-prediction scheme to minimize communication and computation cost thereby reducing the

energy consumption. Sleep/awake scheduling can be applied. A practical algorithm designed for data aggregation will use faster and more efficient cluster-to-cluster propagation.

**Sherin Mathew et al.in 2013[3]** lately, there has been a rapid growth in the wireless communication technique. The projected protocol aims at reducing the overall network overhead and energy expenditure associated with the multihop data recovery process while also ensuring balanced energy consumption among SNs and prolonged network lifetime. This is attained through building cluster structures consisted of member nodes that route their measured data to their assigned cluster head (CH). CHs execute data filtering upon raw data exploiting potential spatial-temporal data idleness and forward the filtered information to appropriate finish nodes with sufficient residual energy, located in proximity to the MS's trajectory. Simulation results specify the superior performance of proposed algorithm to strike the appropriate performance in the power consumption and network lifetime for the wireless sensor networks.

**Laxmi Choudhary in 2012[4]** with the rapid improvement of computer and information technology in the last many years, all type data has been made widely available, e.g., via the Internet. Such tremendous quantity of data has fundamentally changed science and engineering, transforming several disciplines from data-poor to increasingly data-rich, and calling for new, data-intensive methods to conduct research in science and engineering. In this paper, author discuss the research challenges in science and engineering, from the data mining perspective, with a center on the following issues: (1) information network analysis, (2) discovery, custom, and understanding of patterns and knowledge, (3) stream data mining, (4) mining moving object data, RFID data, and details from sensor networks, (5) spatiotemporal and multimedia data mining, (6) mining text, Web, and other unstructured data, (7) facts cube-oriented multidimensional online analytical mining, (8) visual data mining, and (9) data mining by combination of sophisticated scientific and engineering domain knowledge.

**S. Nithyakalyani et al.in 2012[5]** Sensors are very essential for today life to monitor environment where human cannot get involved very a lot. Wireless Sensor Networks (WSN) were used in many real world applications like environmental monitoring, traffic control, trajectory monitoring. It is more demanding for sensor network to sense and collect a large amount of data which are continuous over time, which in turn must to be forwarded to sink for further decision making process. Clustering of sensory data act as a center job of data mining. The constraints in power supply, limited communication, bandwidth, and storage resources are the main challenges in WSN facing today.

**Rouhollah Maghsoudi et al.in 2011[6].** Data Mining face a different situation that the data size is large and want to make a

small model and not too complicated and yet the data as well as describe..One important and sensible facts in the world of machine intelligence and is robotics robots routing. For routing, algorithms including probabilistic methods (filtering particulate), evolutionary algorithms like as genetic, ant's social and optimization particle mass, neural methods - Fuzzy, inequality of matrix method relayed on gradient methods combined sensor information, etc. There are data mining schemes in the years 2010-2008 as a technique for routing and a absolute robot has been used and still is in progress. Overview of the methods in the paper mentioned in diverse articles since 2000 has so far.

**Onur Tekdas et al.in 2009[7]** explore synergies among mobile robots and wireless sensor networks in environmental monitoring during a system in which robotic data mules gather measurements gathered by sensing nodes. A proof-of-concept implementation demonstrates that this approach considerably increases the lifetime of the system by conserving energy that the sensing nodes otherwise would use for communiqué.

**R.Sivaranjini et al.in 2013[8]** Low data delivery competence and high energy consumption are the inherent problems in Wireless Sensor Networks..So as recommend Dynamic scheme for energy consumption and data collection in wireless sensor networks by combining adaptively enabling/disabling forecast scheme, sleep/awake method with dynamic scheme. The presented framework is clustering based. This framework is common enough to incorporate many advanced features and show how sleep/awake scheduling can be applied, which takes our scaffold approach to designing a practical dynamic algorithm for data aggregation, it avoids the need for rampant node-to-node broadcast of aggregates, but rather it uses faster and more efficient cluster-to-cluster propagation.

**Miao Zhao et al.in 2012[9]** data gathering in wireless sensor networks by implying mobile collectors that gather data by short-range communications. However, this approach may lead to considerably increased data gathering latency owed to the low moving velocity of the mobile collector .In this paper, author study the tradeoff between energy saving and data gathering latency in mobile data gathering by exploring a balance among the relay hop count of local data aggregation and the moving tour length of the mobile collector. He first suggested a polling-based mobile gathering approach and formulates it into an optimization problem, named bounded relay hop mobile data gathering (BRH-MDG). Then give two efficient algorithms for selecting polling points among sensors. The effectiveness of the presented approach is validated during extensive simulations.

Ref No	year	Findings	Technique
1	2012	1.Improves the lifetime of the sensor nodes 2.Improves the	Multiple mobile robots

		performance of collecting the sensed data in large-scale sensing fields	
2	2013	stability and prolongs network lifetime	A practical algorithm designed for data aggregation will use faster and more efficient cluster-to-cluster propagation.
3	2013	Appropriate performance in the energy consumption and network lifetime for the wireless sensor networks.	Cluster structures consisted of member nodes that route their measured data to their assigned cluster head (CH)
4	2012	fundamentally changed science and engineering, transforming many disciplines from data-poor to increasingly data-rich	the research challenges in science and engineering, from the data mining perspective
5	2012	A clustering in WSN involves selecting cluster heads and assigning cluster members (sensors) to it for efficient data relay.	clustering in WSN
6	2011	Solve the routing problems	data mining methods
7	2009	Significantly increases the lifetime of the system by conserving energy that the sensing nodes otherwise would use for communication.	synergies among mobile robots
8	2013	avoids the need for rampant node-to-node propagation of	practical dynamic algorithm for data aggregation

		aggregate	
9	2012	significantly increased data gathering latency due to the low moving velocity of the mobile collector	a polling-based mobile gathering approach and formulate it into an optimization problem, named bounded relay hop mobile data gathering (BRH-MDG).

### 3. CONCLUSION

Wireless sensor network technology has the prospective to enable main breakthroughs in the natural sciences by giving scientists the potential to collect high-fidelity data over large geographic regions and extended periods of time. In WSNs, since the sensor nodes are energy constrained and have limited lifetime, energy consumption of sensor nodes becomes as a major issue. Two main approaches: 1) clustering-based: sensor nodes form clusters and elect the cluster heads in such a way to improve energy efficiency, and 2) prediction based: energy-aware prediction is used to find the slight trade-off among communication and prediction cost. Via performance evaluation, it is shown that it achieves energy efficiency even though the object arrived from any random location and moves randomly. K-Means Data Relay (K-MDR) clustering algorithm for WSN reduces the communication overhead and increases the entire network life time by reducing the number of transmission between every sensor node to sink. The K-Means Data Relay algorithm decreases the computational time and improves the performance of the network when compared to K-Means algorithm. Hybrid moving based scheduling strategy for data collection process is improved lifetime of the network. For large coverage area and more number of nodes failure in the network, multiple mobile robots used for separate partition in order to collect data.

### REFERENCES

- [1] V. Karthik, "Region Based Scheduling With Multiple Mobile Robots for Data Collection Strategies in Wireless Sensor Networks", Vol. 2, Issue 7, July 2013
- [2] M. Vijayalakshmi, V. Vanitha, "CLUSTER BASED ADAPTIVE PREDICTION SCHEME FOR ENERGY EFFICIENCY IN WIRELESS SENSOR NETWORKS", Vol 04; Special Issue; June 2013
- [3] Sherin Mathew, S. Nandhini, "A Novel Approach for Sensory Data Collection in Wireless Sensor Networks with Mobile Sinks", Volume 2, Issue 2, March 2013
- [4] Laxmi Choudhary, "CHALLENGES FOR DATA MINING", Volume 2, Issue 2 (February 2012)
- [5] S. Nithyakalyani and S. Suresh Kumar, "Data Relay Clustering Algorithm for Wireless Sensor Networks: A Data Mining Approach", 2012
- [6] Rouhollah Maghsoudi, Somayye Hoseini, Yaghub Heidari, "Surveying Robot Routing Algorithms with Data Mining Approach", Vol. 2 No.2 (2011) 284-294
- [7] Onur Tekdas And Volkan Isler, University Of Minnesota Jong Hyun Lim And Andreas Terzis, Johns Hopkins University, "Using Mobile Robots To Harvest Data From Sensor Fields", 2009

- [8] R.Sivaranjini, E.Dinesh, "An Adaptive scheme for energy consumption and data collection in Wireless Sensor Networks", Volume 2 Issue 3 | March. 2013 | PP.50-55
- [9] Miao Zhao, Member, IEEE, and Yuanyuan Yang, Fellow, IEEE, "Bounded Relay Hop Mobile Data Gathering in Wireless Sensor Networks", Vol. 61, No. 2, February 2012