

“Data reduction in WSN using Machine Learning for CCTV data”

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ABSTRACT

Wireless sensor networks consist of spatially distributed sensor nodes to sensing, processing, and monitoring environmental parameters to reporting at the sink node (base station). Sensor nodes are transmitting data from the sensor node to the base station. Sensor nodes are measured data adaptively or dynamically using throttling techniques to reduce data and transmit it to the base station. In throttling data reduction technique threshold exceed data transmit from sensor nodes to sink node. In WSN minimize energy consumption using the data reduction throttling algorithm to reduce the size of data. Here, we proposed a Controlled Duty Cycle Scheme for minimizing energy consumption in a wireless sensor network. The controlled Duty Cycle Scheme is used for energy efficiency to increase routing fairness. The main goal of data reduction with the Controlled Duty Cycle technique is to increase the life of the Wireless sensor network by consuming minimum energy.

1.INTRODUCTION

Wireless Sensor Networks consist of different types of sensors containing small micro-controller boards called sensor nodes. They are communicating wirelessly using a radio link. In the development area sensor nodes are deployed in the hostile and inaccessible site. WSN provides a

broad range of application areas including health monitoring, military, industry, sport, and agriculture. In WSN consists mostly of three steps, Firstly is a sensor node gathering data from environment parameter, the second is processing and the third is transmitting data (result) using wireless radio link to sink node. The sensor node is self-organized and transmitting data as well as other sensor messages. Wireless Sensor networks are many challenges like sensor nodes have limited communication, limited sensing energy, small memory, limited processor capability, Sensor node hardware failure and low battery power, etc. Therefore, energy consumption is the main challenge in a wireless sensor network. Sensor nodes required energy for sensing, processing, and transmitting Data from sensor nodes to sink nodes. Sensor nodes are running on battery power. Recharging and replacing the battery is impossible in WSN. Thus enlightening the issue of power consumption in a wireless sensor network. It increases the importance of minimizes power consumption for wireless sensor network which in increase the lifetime of WSN.

2.LiteratureSurvey

In wireless sensor networks (WSNs), thanks to the restriction of scarce energy, it remains an open challenge the way to schedule the info communications between the sensor nodes and therefore the sink to scale back power usage to maximize the network lifetime. To face this challenge, this paper proposes a workable digital communication scheme utilizing the hierarchical Least-Mean-Square (HLMS)

adaptive filter. The HLMS predicting techniques are explored that predict the measured values both at the source and at the sink, sensor nodes are subsequently required only to send those readings that deviate from the prediction by a mistake budget. Such a knowledge reduction strategy achieves significant power savings by reducing the quantity of knowledge sent by each node. We discuss the working mechanism of HLMS within

the purpose of knowledge reduction in WSNs, analyze the mean-squared error within the two-level HLMS, and style the interactive HLMS prediction algorithm implemented at the sink and sensor node and therefore the transmission protocol between them. To elaborate on our theoretical proposal, the HLMS algorithms and protocols are then evaluated by simulation. Simulation results show that our proposed scheme achieves major improvement in convergence speed compared with previous approaches, and achieves up to 95% communication reduction for the temperature measurements acquired at Intel Berkeley lab while maintaining a minimum accuracy of 0.3 °C [1]

Wireless sensor networks are commonly wont to collect observations of real-world phenomena at regular time intervals. Sensor nodes believe limited power sources, and a few studies indicate that the most source of energy consumption is said to data transmissions. during this paper, they propose an approach to scale back data transmissions in sensor nodes supported data dispersion analysis. This approach aims to avoid transmitting measurements whose values present low dispersion while keeping a coffee CPU utilization rate. Performance evaluation results obtained by the Castalia simulator confirm that the results were promising in reducing data transmissions while maintaining significantly low time interval, data accuracy, and low energy consumption[2]

Wireless sensor networks (WSN) are critically resource-constrained thanks to small memory, limited power supply, low processing capability, and narrow communication bandwidth. Tremendous researches are geared towards optimizing some aspects of packet transmissions to mitigate those constraints. The energy efficiency of a sensor node is suffering from the method of knowledge packet transmission from the sensor board to the fusion center (FC) and also by its packet size. an efficient technique to scale

back data transmission within the WSN is to locally reduce the amount of packets before transmission. during this paper, the performance of various computational intelligence-based algorithms that reduce the info packet traffic is presented. These methods are data reduction supported artificial neural networks (DR-ANN); data reduction methods supported Independent Component Analysis (DR-ICA) and one that's supported regression utilizing the deep learning method (DR-GDMLR). These algorithms are applied to different applications and datasets type. The simulation results with the simplest performance are shown by the DR-ANN algorithm that reduced the dimensions of transmitted data by 66%, while the opposite two algorithms only reduced the dimensions by 33% [3]

In wireless sensor networks (WSNs), many sensor nodes are typically deployed within the field to supply a long-term monitoring facility. These sensor nodes are usually collect an enormous amount of knowledge over time. Transmitting the large data from the sensor nodes to a sink introduces an enormous challenge to the network thanks to the energy constraint of the sensor nodes. Therefore, many research efforts are administered thus far to style efficient data clustering techniques for WSNs. the most purpose of those techniques is to scale back the quantity of knowledge over the network while retaining their fundamental properties. This paper aims to develop a Histogram-based Data Clustering (HDC) technique at the cluster-head (CH) for in-network data reduction. The HDC groups the homogeneous data into clusters then performs in-network data reduction by selecting the central values (instead of all data points) of every cluster [4]

Wireless sensor networks contains spatially distributed sensor nodes to sensing, processing, and monitoring environmental parameters to reporting at the sink node (base station). Sensor nodes are transmitting data from the sensor node to the bottom station. Sensor nodes are measured data adaptively or dynamically using throttling techniques to scale back data and transmit it to the bottom station. In WSN minimize energy consumption using the info reduction throttling algorithm to scale back the dimensions of

knowledge. Here, we proposed a Controlled Duty Cycle Scheme for minimizing energy consumption during a wireless sensor network. CDC Scheme is employed for energy efficiency to extend routing fairness. The most goal of knowledge reduction with the CDC technique is to extend the lifetime of Wireless sensor network by consuming minimum energy [5]

The wireless sensor network is deployed in remote and hostile areas where no infrastructure is out there. Wireless sensor network includes sensor nodes for sensing to watch the physical and condition. Recently, Wireless Sensor Networks (WSN) were utilized in many areas just like the military, environment monitoring, hospitals, biological equipment, biomedical, health monitoring, etc. The limitation of WSN includes a lifetime of network, Battery, Bandwidth, Energy, etc. during this paper, data reduction for Energy minimization within the network is especially focused on. Data reduction is one among the info pre-processing techniques of knowledge mining which will increase storage efficiency and reduce costs. Data reduction (DR) aims to get rid of frequently occurring data while transmission. For this purpose, many data reduction strategies are introduced counting on the scenario of WSN. during this survey data reduction, algorithms and techniques are introduced, which helps to extend energy also as prolong the lifetime of the network [6]

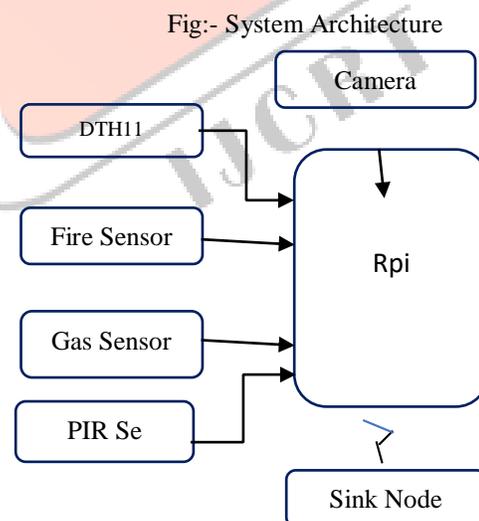
3. Objectives of System

An approach to reduce data transmissions in sensor nodes based on data dispersion analysis and aims to avoid transmitting measurements whose values present low dispersion while keeping a low CPU utilization rate.

- Can be used in fields like Disaster Monitoring
- Can be used for Health Monitoring in Hospitals
- Can be used in both Automobiles Industry and Mechanical Industry

4. Implementation Details of Module

The system's main need and objective of this work is to reduce the data to be transmitted from the sensor to the sink node, which will save the energy of the data items which are not transmitted to the sink. It means if we can avoid data from sending to sink will give rise to energy-saving and prolong the life of the sensor, which prolongs the life of network. In WSN maximum energy would be consumed for transmission of the data from a sensor to sink. We have proposed threshold-based data reduction for a multi-sensor network. As more than one parameter need to be monitored from the environment and not all sensor will monitor the data at a time, it starts with monitoring of one parameter only and when the monitored value crosses the threshold then only next sensor will be activated and this goes on till the last sensor. Thus it means we have reduced the data being transmitted. Hardware such as raspberry pi and various sensors are been used in the proposed system.



5. CONCLUSION

In this system, a data reduction adaptive frame rate algorithm SVM is presented to adapt the frame rate of each sensor node. This adaptation leads to reduce the number of sensed data on the sensor node level. Thus, it reduces the energy

consumption needed for the sensing process. The data reduction algorithm adds a comparison between data with the last data sent, if both data are similar, the second one is not sent to the coordinator. In case the second data is different, the difference between the two data is sent to the coordinator. This functionality reduces the energy consumption for the transmission process on the sensor node level by reducing the number and the size of the data sent to the coordinator.

REFERENCES

- [1] Liansheng Tan and Mou Wu “Data Reduction in Wireless Sensor Networks: A Hierarchical LMS Prediction Approach”, Research Gate, Sep 29, 2020
- [2] Janine Kniess and Samuel Oliveira, “Data reduction in sensor networks based on dispersion analysis”, Springer, 05 Feb 2020
- [3] Jiwa Abdullah, M. K .Hussien, M. I .Husni, “Data Reduction Algorithms based on Computational Intelligence for Wireless Sensor Networks Applications”, IEEE 9th Symposium on Computer Applications & Industrial Electronics (ISCAIE) 2019
- [4] M.K. Alam and S.A Latif, “Ata Clustering Technique for In-Network Data Reduction in Wireless Sensor Network”, IEEE Student Conference on Research and Development (SCORed), 2019

