

Sensor Selection and Data Fusion for Internet of Things (IoT)

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ABSTRACT: IOT is become a part of weather monitoring, health-care, asset monitoring modern warfare scenarios, industrial and production monitoring to store sensor related data in Cloud computing server. One major challenge for the IoT is to handle vast amount of sensing data generated from the smart devices that are resource-limited and subject to missing data due to link or node failures. The problem to handle sensing data generated in IOT may arise missing of data, node failure & limited resource. By exploring the cloud computing with the IOT we present the cloud-based solution to maintain the secured sensor data. In this project, we improve the energy consumption by providing low energy to sensor as well as improve the sensor quality to predicted data accuracy in cloud computing server. We propose a multiphase adaptive sensing algorithm with belief propagation (BP) protocol (ASBP), which can provide high data quality and reduce energy consumption by turning on only a small number of nodes in the network. We formulate the sensor selection problem and solve it using both constraint programming (CP) and greedy search.

KEYWORDS: Internet of things (IOT), Sensor, Data fusion, Performance parameters.

1. INTRODUCTION

(A)Background

In this project, focus is given to using sensor technology as a service, the integration of sensor technology and internet services, and methods of communication between them. Smart technologies have become increasingly popular in the field of object tracking and location due to their promising capability in different environments. At present, real-time management Information Systems (MIS) based on raspberry technology, Wi-Fi technology and Internet of Things (IoT), are being used to manage the huge data generating from the sensor in realtime. The term 'real-time system' refers to systems that provide an automatic identification and collection of location information. A sensor device is attached to objects that are interconnected to exchange services, which in turn are integrated the organization is computing network.

(B) Motivation

IoT is a new concept that is closely related to and motivated by sensor technologies. It is founded on environments, which produce real-time data, support the monitoring, and control system in different locations. Wi-Fi wireless technology can be used to receive data through electronic devices using cloud server to provide several automatic services such as data management, control and device management. Wi-Fi is used as a wireless protocol to provide communication between various sensor devices and applications that require reliable and low data rate transmission, low power consumption within a comparatively short distance and a longer battery life. The collected information is can be made available on Cloud Computing to provide remote access. There are many reasons to study the use of sensor technologies in a healthcare environment such as time factors and the potential for this technology to be used in different ways within operations management. The information that derives from these devices will challenge the traditional approach to data management and assist with the emerging prototype of large data in providing a more effective management system. The information received from the sensors will be used to build a framework and design for a Management Information System (MIS) for healthcare. The technologies are classified by their functionality in

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this framework. The network framework focuses on the system structure and data flow in the system, and the relationship between each component. A structured interview process with two senior hospital administrators, the Director of the Hospital and the IT Director, was conducted in one of the in the main hospital.

(c) **Aim-** Proposed system is expected to produce maximum throughput with minimum data fusion. Adding sensor node security to cloud based sensors.

(D) Objective

1. To Utilizes highly correlated Spatio-temporal data in the network and to reconstruct the missing data due to packet losses and the sensor selection strategy.
2. To gives the Solution of active sensor selection optimization problem.
3. To Conduct extensive simulation with a real deployment of a sensor network.

II. RELATED WORK

1. **L. Atzori, A. Iera, and G. Morabito**, "The Internet of Things: A survey," Comput.Netw. are provides an overview of the Internet of Things (IoT) with emphasis on enabling technologies, protocols, and application issues. The IoT is enabled by the latest developments in RFID, smart sensors, communication technologies, and Internet protocols.

2. **L. Palopoli, R. Passerone, and T. Rizano**, "Scalable offline optimization of industrial wireless sensor networks, consider the problem of optimizing a cost function for wireless sensor networks of this kind under energy consumption constraints. Mainly focus, in particular, on the problem of coverage optimization through scheduling. Systems show how to use partitioning techniques to decompose the problem into separate subproblems, solved individually, overcoming the exponential complexity typical of integer linear programming, while minimizing the loss in optimality.

3. **F. V. Jensen**, Introduction to Bayesian Networks, provides an overview of the techniques involved. It proceeds by giving a mathematical overview of what Bayesian networks are and the flavors they come in. It then looks at how they can be created or learnt from data and the situations that lead to the use of ensemble models.

4. **Punit Gupta¹, Deepika Agrawal², Jasmeet Chhabra³, Pulkit Kumar Dhir⁴**. This author gives the details of Rule's Accessible authentication are differentiated in this system. In this paper we use Rule's authentication are combined in the separate module.

5. **Darshan K R, Anandakumar K R**:-Current IoTs is achieved using physical platforms that lack intelligence on decision making. A proactive architecture that deploys EventCondition-Action(ECA) method is proposed to resolve the management of heterogeneous IoTs in smart homes. The proactive architecture, developed with a core repository stores persistent data of IoTs schema, proved to be an ideal solution in solving interoperability in smart homes. In this paper we use Improve the management of heterogeneous data proposed for IoTs.

III. PROPOSED SYSTEM

Here, researcher designed health monitoring system using Aurdino microcontroller with Wireless Body Area Sensor Network (WBASN) . In this work, the sensors are used here Temperature sensor, Smoke carbon dioxide sensor, smoke ethylene sensor . These sensors are attached to the computer through USB cable. This sensor senses the real time data from the environment.

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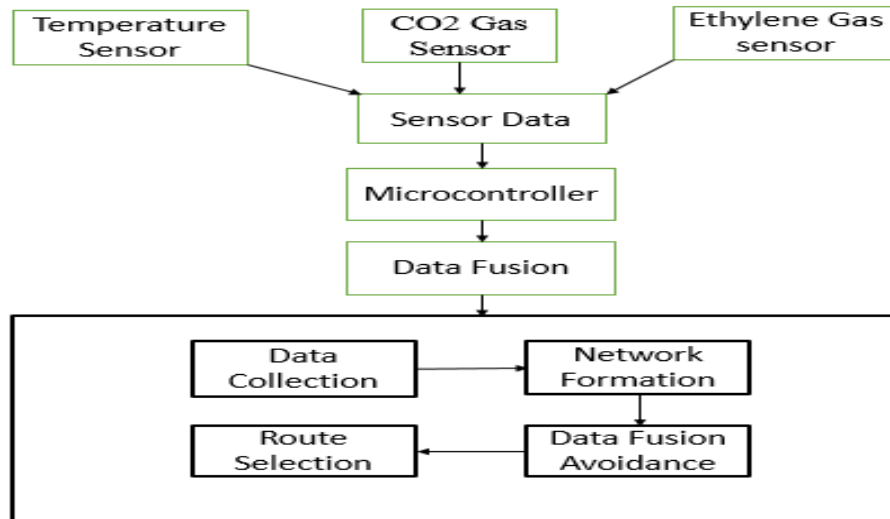


Fig 1:-System Architecture

Advantage

1. secured storage of data is achieved
2. Improve the speed due to fast data fusion maintenance
3. huge data can maintenance can be achieved
4. Runtime attach and detach the sensors easily.

IV. ALGORITHMS USED

1.Packet Offset Algorithm:-Packet offset algorithm is used for adding noise to original message and sensor node address. This is encoding for packet forwarder nodes in wireless communication.

Input: A recent offset sequence

Output: V_i : the estimated offset of the source and forwarder

2.Packet Transmission Algorithm:-This algorithm is used for packet transmission in wireless packet transmission. This is request and response model for packet acknowledgement.

Input : - Number node, neighbors, connection Links

Output: - Network scheduling with distributed network

3.Shortest Path:-Dijkstra Algorithm

Algorithms for calculating shortest path from source to sink about as computationally expensive as calculating shortest paths from source to any vertex

Why we use Dijkstra Algorithm:-

Solution to the single-source shortest path problem in graph theory

1. Both directed and undirected graphs
2. All edges must have nonnegative weights

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3. Graph must be connected

V. EXPERIMENTAL SETUP

The system has been implemented Java (JDK 1.7) with eclipse jee-indigo-SR2-win64 with hardware aurdinouno,temperature sensor,smoke CO2 sensor and smoke ethylene sensor. with JSP server serving java technologies. The system is tested on Intel(R)Core(TM)i3 2330M CPU @\$ 2.20 GHz and 4 GB RAM. The System uses My-SOL, a open source relational database management system that uses SQL for adding, managing and accessing content in a database.

Dataset Processing:-

Dataset contain real time data of sensor i.e. temperature sensor,smoke carbon dioxide sensor,smoke ethylene sensor.

VI. PERFORMANCE METRICS

1. Throughput:-This measure identifies throughput at end-to-end packet transmission and packet delivery ratio at wireless sensor network.Proposed system is expected to produce maximum throughput with minimum data fusion. Adding sensor node security to cloud based sensors.

Throughput is calculated as following formulas:-

$$\text{Throughput} = \text{Packet sent} - \text{Received packet}$$

2. Delay:- Delay refers to the time taken for a packet to be transmitted across a network from source to destination.Delay is calculated as following formulas:-

$$\text{Delay} = \text{End Time} - \text{Start Time}$$

3. Packet Delivery Ratio:- The ratio of packet that are successfully delivered to a destination compared to numbers of packet that have been send out by source.

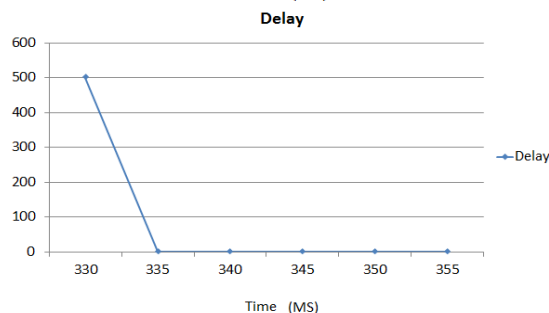
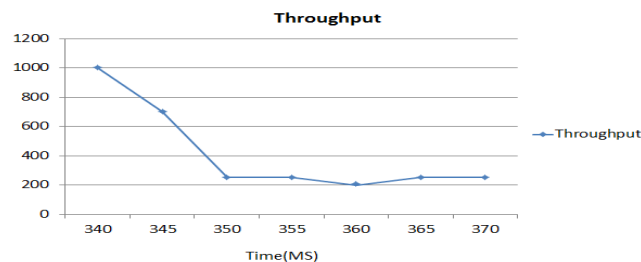
$$\text{Packet delivery ratio} = \left\{ \frac{\text{packet received}}{\text{packet sent}} \right\} * 100$$

4. Packet Loss Ratio:Packet loss occurs when one or more packets of data travelling across network fail to reach their destination. Packet loss is typically caused by network congestion.

$$\text{Packet loss ratio} = \text{packet delivered} - \text{received packet}$$

5. Overhead: The time it takes to transmit data on a packet switched network.

$$\text{Overhead} = \text{number of node visit count in simulation}$$

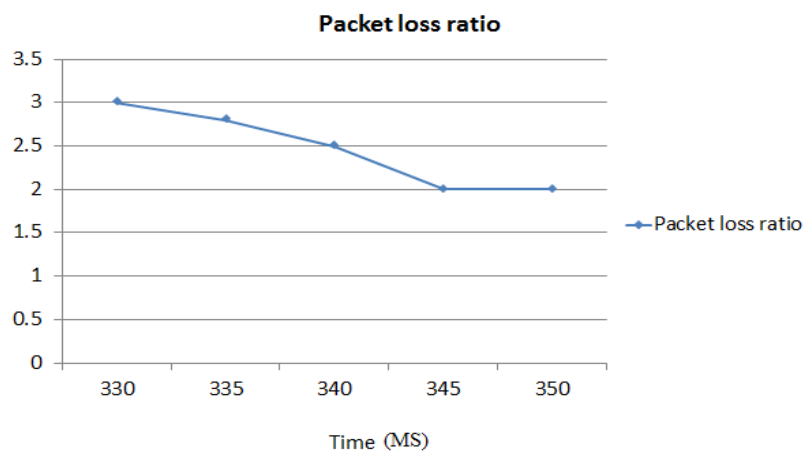
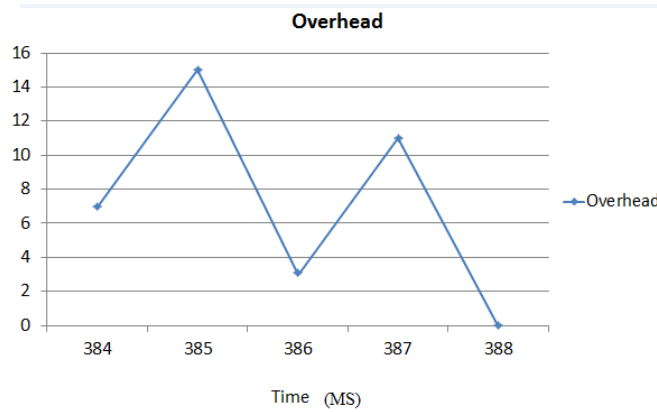
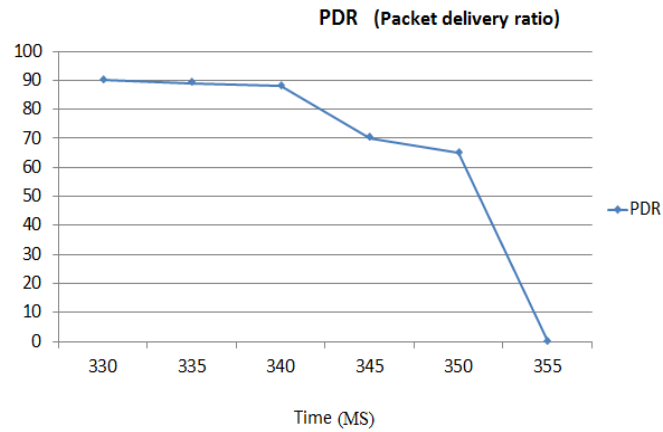


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VII. RESULT TABLE

Nodes	Source	Destination	<u>Failure_node</u>	Distance	Path
30	7	15	10	296	7-8-9-13-14-15
35	14	23	4,8,10	289	14-13-22-24-23
80	50	70	6,13,30	288	50-51-59-62-67-70
50	25	30	11,19	196	25-28-30
60	45	56	5,8,49	178	45-47-46-55
55	27	46	19	297	27-29-44-46
65	32	52	2,8,18,27	223	32-30-33-52
75	66	75	20	296	66-69-73-75
90	57	72	15,29,39	206	57-55-73-74-72

VIII. APPLICATIONS

1. Use of this system is in Healthcare system.
2. Applicable for the Patients and doctors.
3. System captured real time sensor data.

IX. CONCLUSION

Internet of Things has many applications in different areas. IoT has been already designed for wireless sensor network (WSN). It has been developed for health monitoring. This system presents the architecture of IoT and sends the real time sensor data from source to destination. For transmission of packets different algorithm is used that is packet offset algorithm, packet transmission algorithm, shortest path algorithm. This system achieves the concept like node failure, energy efficiency, data fusion.

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