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DatComm: Scheduling of the Network Traffic based on Mobility Bandwidth via Segment Resizing & Redundancy Elimination Mechanism

Kirthika. P
Research Scholar

Abstract: The wireless mobile network for efficient data communication through employment of wireless sensor nodes for network monitoring is considered as research paradigm in this work. The Monitoring nodes in the Wireless Network produces more redundant information about the network selection Parameters like Node density, data Inference , Node failure and Node outage due attacker and Energy degradations . In this work, we propose a novel Routing mechanism incorporating the Monitoring information for effective data communication and Network Management. The Cost effective and Quality of Service Factor such as Bandwidth resizing mechanism , Redundancy and Data compression mechanism is modelled for the network traces collected from the monitoring unit and after merging operation. The Data compression and Redundancy elimination induces mutual benefits such as storage management in the routing table and path selection criteria in the route selection. The Experimental results prove that proposed mechanism outperforms existing mechanism against the memory management and scalability.
Index Terms – Wireless Sensor Networks, Routing, High Coverage, Network Outage

I. INTRODUCTION

Wireless Sensor Network is employed to monitor the Target areas and its communication medium of the wireless node. The Maintenance and deploying of wireless sensor network is considered as important problem in this research. As wireless Network mostly rely on sensor node for measurement about the route traffic and node density to make necessary strategies for efficient data communication [1]. The wireless sensor node will even fail to produce efficient measurement due interference, collision and node outage when less no of node is allowed to sense and further it leads to biased conclusion. The primary solution to handle or tackle the problem is through employment of sensor nodes across the entire region of interest to capture the information as possible [2]. The Monitored information is meant as traces and several mechanism has been developed to handle the traces in order to generate the routing information for data routing in the any kind of wireless mobile Networks. The information collected from the distributed sensor will lead to scalability and more complexity issue in the decision making related to the routing. The Sensed information increase with the no of sensor deployment, even more no of sensor deployed will lead to high bandwidth utilization and redundant information maintenance. Technique leads to memory and synchronization issues in monitoring traces using large no. of sensors. The Synchronization of data cannot carried to some data as it clock drifted among the traces [3]. Hence it is mandatory to design an efficient Monitoring system for scheduling of network traffic on mobility bandwidth through segment resizing and redundancy elimination mechanisms. The Proposed Technique has to enable with coherence property using timestamp in the traces. A proposed used for routing mechanism incorporating the Monitoring information for effective data communication and Network Management. The Cost effective and Quality of Service Factor such as Bandwidth resizing mechanism , Redundancy and Data compression mechanism is modelled for the network traces collected from the monitoring unit and after merging operation. The Data compression and Redundancy elimination induces mutual benefits such as storage management in the routing table and path selection criteria in the route selection. The rest of paper is organized as follows, Section 2 describes the related work, section 3 describes the proposed model in detail, section 4 deals with experimental analysis and finally section 5 is concluded.

II. RELATED WORKS

A. Trace Similarity and Community Detection

The Wireless sensor node's monitored information is collected as traces. These traces are merged in the single file to further the network management and organization. The level of similarity in the trace depends on the amount of flows or frames captured by both traces in the different trace file of sensor nodes [4]. Hence, the higher the intersection between the traces, the higher their similarity. The identified intersection can have different impacts on the metric depending on additional parameters, such as the rarity or the duration of the flow. We also evaluate these alternatives assigning weights to them. Incorporating community-based algorithms provides the solution to find “communities of traces”, as a clue to the merging of number of top-ranked traces.

B. Trace Ranking and Sensor Positioning mechanism

The Ranking of traces by merging the information collected by sensor nodes will be carried using fully connected graph mechanism. Fully-connected graph uses the vertices to represent the traces and the edges between the vertices as weighted according to pair wise trace similarity. Based on this model, ranking of the more relevant traces computing possible paths in the graph is modelled [4]. The Main impact of the ranking method is to identify monitors which not well positioned in the monitoring area. By analysing the list of ranked traces from bottom-up, will leads to identify the monitors that are badly placed. Hence the list of appropriate badly deployed sensed nodes will be decided to be moved elsewhere. Note that monitor repositioning can be particularly useful in spontaneous wireless networks such as ad hoc networks in general, as they do not count on any central entities that could be used as monitors .Even considering central entities, they may not be always accessible.

C. Near linear time Technique to detect community structures

It analysis the traces log file after merging it, which incur the knowledge about the similar traces in the large consolidated trace file. Before gathering the log file, every node is initialized with a unique label and at every step each node adopts the label to identify neighbors information concurrently to eliminate the logging of the same information which already logged by the neighbour node. In this iterative process densely connected groups of nodes form a consensus on a unique label to form communities structure which leads to efficient memory management process.

III. PROPOSED MODEL

In this Section, we model wireless sensor nodes for monitor the wireless mobile Network for efficient bandwidth management using the segment resizing and redundancy elimination process.

A. Trace Merging

The three principles are maintained in the trace merging , usually traces is collected from the multiple sensor nodes deployed in the target regions to analyse the network for Bandwidth Management and routing optimization. The traces merging is carried out as follows

B. Similarity Computation

The Similarity between the traces is carried out using pair wise similarity Matrix. Traces are connected in graph passion. The fully connected graph is used to represent the traces , traces similarity is calculated from it , in graph model vertices represents the trace and weight represent no of similar occurrence of the traces using matrix calculation.

C. Community Structure Formation

List of similar traces are gathered and label is generated and named it as community. The Community is formed for similar traces which has same position and same time stamp. Further ranking algorithm is utilized to rank the community of the similar traces and to rank the sensor node for unique no of traces traced which does not belong to any traces for the sensor node deployment in the target region. Community Structure is also meant for trace merging.

D. Route Selection Based Segment Resizing

As monitoring node is capable of producing the Network characteristic which further used for route or path selection for data transmission. Segment of bandwidth is controlled for heavily dense sensor node for monitored data sharing for efficient production of the path for the data communication. The Segment of the sensing node and base Station is modified according to the communication traffic and dissimilarity in the traces generated. Base Station which collects traces will be capable generating the routing information for further process in networking. The Traces of the Sensing node contains the following information such as

1) Node density
2) Node lifetime
3) Channel Strength
4) Channel Interference

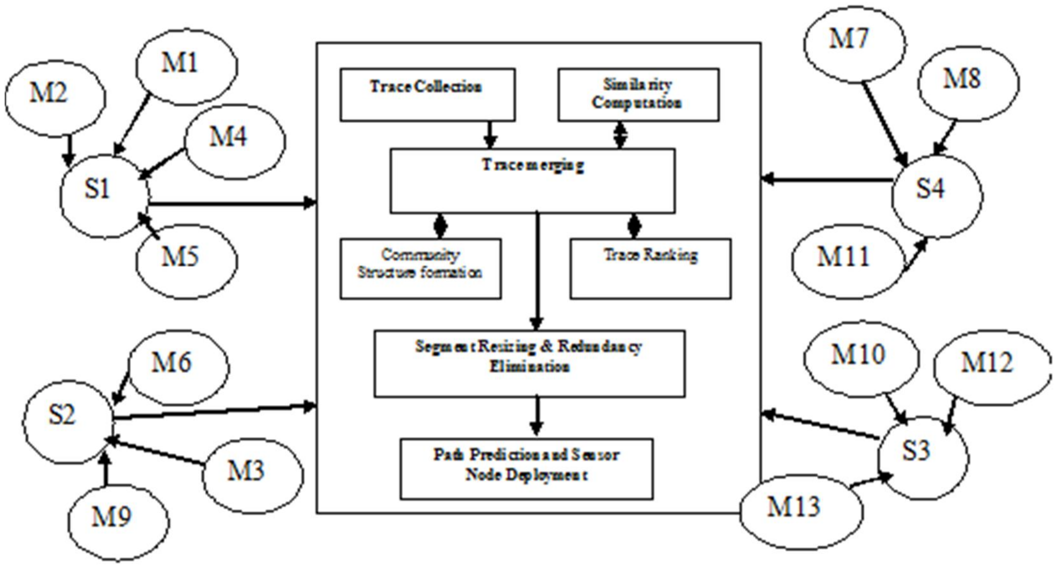

Figure 1 Architecture Diagram of the Proposed Model

The Node scheduled for the data communication using these measurement based Strategies. The Figure 1 describes the architecture of the proposed model in the efficient network management.

E. Data Redundancy Elimination in Traces

The data redundancy in traces is eliminated using the Ranking mechanism. The Ranking of the traces is carried out using minimum spanning tree mechanism. The Weights of traces computed in the fully connected graph will provide suggestion for sensor movement or new sensor deployment based on the target area[6]. The Algorithm 1-DATCOM describes entire follow novel network traffic management as follows

Algorithm 1 – DATCOMM
Input – Traces = (T1, T2..... Ts)
Output – merging Trace Similarity by generating community and Routing Table Formation
O = (C1, C2, C3....CS)
Process
Compute
If (Metric Similarity of Traces is equal && Time Stamp of Trace is equal)
Merge the Trace together
Generate new Community C_n
Rank the Similar Traces in the Community R_n
Else
Deploy a New Senor Node on the Target Region for Tracing S_n

F. Path Prediction and Sensor Node Deployment

The Sensor Node yields the path information and node density of the entire network using similarity traces [7]. The Similarity Traces generating community will not provision a new node deployment instead it leads to reduce the senor node in the particular target region as it increases the scalability and memory of the trace file which further harden the computation of the route selection . The Path Selection and prediction is carried only after the processing of the trace merging & Ranking [8]. The major benefit of the trace usage is to reduce communication burden in the network.

IV. EXPERIMENTAL RESULTS

The Simulation of the Wireless Sensor Node and Wireless Mobile Network is simulated using the development of animation window using Dotnet. The Animation Window is designed with 75 nodes of source , among 75 nodes some nodes acts as sensing node to generate the trace information of other nodes in the network . The Proposed Mechanism is defined with information such as maximum delay and minimum available bandwidth of each node in the routing table or Trace log file.

Each Sensing node generates the trace file about the target area to base station to form the routing information. The routing information is further processed with similarity computation mechanism, community generation mechanism, segment resizing mechanism and redundancy elimination mechanism. The outcome of each process is directs us to trace merging, trace merging is carried out in order to reduce the memory management of the traces. Redundancy elimination improves the scalability of the system.

Table 1- Simulation Parameter of the Microsoft Network Animation Window

Simulation Parameter	Value
Simulator	Microsoft Network Animation Window
Topology Size	1000m *1000m
Number of Nodes	75
Bandwidth of the Network	2Mbps
Distance between the node	50m

The community detection and similarity traces gathering experimented with performance measures such as packet transmission rate and packet delivery ratio. The figure 2 describes the simulation outcome of the proposed model.

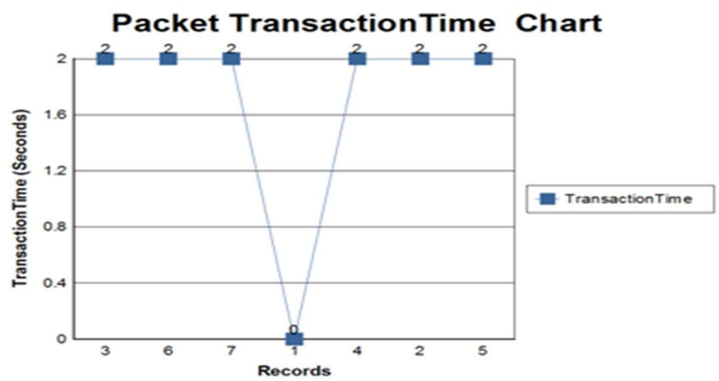

Figure 2- Performance Evaluation of the Packet Transmission in the proposed model

Even single node information from sensor node as trace is considered as community. It will be iteratively advance the merging communities based on distance metric between the nodes which defined earlier. The process ends when only one community, containing all the nodes, is achieved, but the best split is the one which maximize the modularity metric. Merging traces from different monitors assumes that a monitor might capture an event that another monitor

Misses. Table 2 describes the network information of routing table for path prediction.

The ranking of the Trace in the Community for individual traces after merging is performed, the ranked traces is further used for path selection in routing.

Table 2 – Network information as Routing Table

Node id	Node Density based on Transmission Time
3	2
6	2
7	4
4	1

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Hence routing table contains the high scalability and less memory utilized. The Figure 3 describes the performance evaluation of the data transmission in the network.

The path selection after network management produces the better transmission range and high packet delivery ratio.

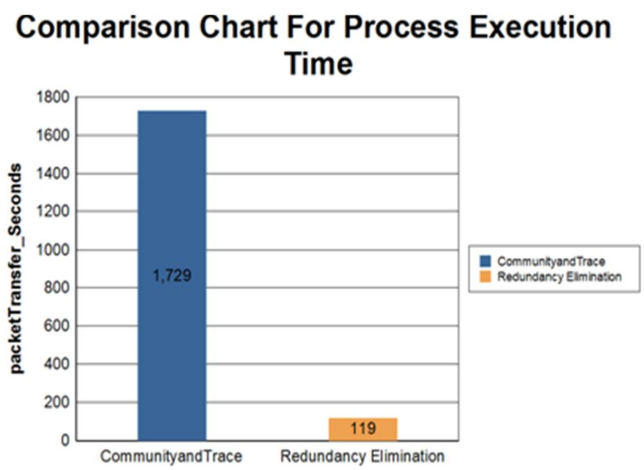

Figure 3 – Performance Comparison of the Algorithms

The Sensor monitoring is also interchanged based on the similarities computation and ranking mechanism. The Monitoring sensor node position is purely based on the community structure .Table 3 describes the performance comparison of the existing and proposed model.

Table 3 – Performance Comparison of the Scalability Algorithms

Technique	Packet Delivery Ratio
Community And Trace Similarity detection	1729ms
DATCOMM	119ms

The results attesting that our method leads to scalability improvements, meaning that we can achieve a higher level of accuracy with a lower number of traces. Selecting a subset of traces can improve scalability as the procedure of finding the subset of the most representative traces help reduce the number of merging operations (which are costly). Although the subset selection procedure adds complexity to the system, it is executed less often than the whole merging procedure.

V. CONCLUSION

In this work, we designed and simulated the usage of Sensor node and its traces against the path prediction and efficient data routing .Routing mechanism incorporating the Monitoring information for effective data communication and Network Management through enabling the trace similarity computation and community structure generation mechanism. The Cost effective and Quality of Service Factor such as Bandwidth resizing mechanism , Redundancy and Data compression mechanism is modelled for the network traces collected from the monitoring unit and after merging operation. The Data compression and Redundancy elimination induces mutual benefits such as storage management in the routing table and path selection criteria in the route selection. The Experimental results prove that proposed mechanism outperforms existing mechanism against the memory management and scalability.

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