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A Sequence Analysis Approach to perform Resource Allocation in Mobile Networks

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Abstract: **A Mobile network is the interconnection of vast number of users over the network. Each user is assigned with same number of resources. Now such kind of network suffers from the problem of congestion as well as starvation. The proposed work is about to get the maximum outcome from the network. In this work we are finding the most frequent pattern over the network between different kinds of users. In this work we are presenting an improved inverted table approach to find the most frequent pattern between the mobile users. We have showed the work to pass the input in terms of some mobile usage in terms of user access and we will find the user or the user group who is utilizing the network with maximum usage. The work is about the distribution of maximum resources among such users. The work is divided in two main modules. One to maintain the database in terms of Inverted table and second to resolve any user query on this inverted table to get the most appropriate results from the database.**

Keywords: Mobile Network, Resource Allocation, Inverted Table, Bandwidth, Time Sharing

I. INTRODUCTION

A Mobile ad hoc network is a group of wireless mobile computers (or nodes). In which nodes collaborate by forwarding packets for each other to allow them to communicate outside range of direct wireless transmission. Ad hoc networks require no centralized administration or fixed network infrastructure such as base stations or access points, and can be quickly and inexpensively set up as needed. A MANET is an autonomous group of mobile users that communicate over reasonably slow wireless links. The network topology may vary rapidly and unpredictably over time, because the nodes are mobile. The network is decentralized, where all network activity, including discovering the topology and delivering messages must be executed by the nodes themselves. Hence routing functionality will have to be incorporated into the mobile nodes.

MANET is a kind of wireless ad-hoc network and it is a self-configuring network of mobile routers (and associated hosts) connected by wireless links – the union of which forms an arbitrary topology. The routers, the participating nodes act as router, are free to move randomly and manage themselves arbitrarily; thus, the network's wireless topology may change rapidly and unpredictably. Such a network may operate in a standalone fashion, or may be connected to the larger Internet Problems in Ad Hoc Networks [7].

A) ***Problems in routing with Mobile Ad hoc Networks***

a) Asymmetric links

Most of the wired networks rely on the symmetric links which are always fixed. But this is not a case with ad-hoc networks as the nodes are mobile and constantly changing their position within network

b) Routing Overhead

In wireless ad hoc networks, nodes often change their location within network. So, some stale routes are generated in the routing table, which leads to unnecessary routing overhead.

c) Interference

This is the major problem with mobile ad-hoc networks as links come and go depending on the transmission characteristics, one transmission might interfere with another one and node might overhear transmissions of other nodes and can corrupt the total transmission.

d) Dynamic Topology

Since the topology is not constant; so the mobile node might move or medium characteristics might change. In ad-hoc networks, routing tables must somehow reflect these changes in topology and routing algorithms have to be adapted. For example in a fixed network routing table updating takes place for every 30sec. This updating frequency might be very low for ad-hoc networks

B) DNA Sequencing

DNA molecules are composed of single or double DNA fragments or often called oligonucleotides (oligos for short) or strands. Nucleotides form the basis of DNA. A single stranded fragment has a phosphor-sugar backbone and four kinds of bases denoted by the symbols A, T, G and C for the bases adenine, thymine, guanine and cytosine respectively. These four nucleic acids, which can occur in any order

combined in Watson-Crick complementary pairs to form a double strand helix of DNA. Due to the hybridization reaction, A is complementary with T and C is complementary with G. Base pairs are the most common unit for measuring the length of a DNA. A DNA can be specified uniquely by listing its sequence of nucleotides on base pairs. As an example, any sequence oligonucleotides, such as 5' – ACCTG – 3' has a complementary sequence, 3' - TGGAC – 5'. Digits 5' and 3' denote orientation of DNA oligonucleotides [16].

II. **LITERATURE SURVEY**

Chih-Chieh Hung performed a work," Exploring Regression for Mining User Moving Patterns in a Mobile Computing System". In this paper, by exploiting the log of call detail records, Author present a solution procedure of mining user moving patterns in a mobile computing system. [1]. Karen H. Wan performed a work," Group Mobility and Partition Prediction in Wireless Ad-Hoc Networks". By exploiting the group mobility pattern, Author can predict the future network partitioning, and thus minimize the amount of disruptions. In this paper, Author propose a new characterization of group mobility based on existing group mobility models, which provides parameters that are sufficient for network partition prediction. Author then demonstrate how partition prediction can be made using the mobility model parameters, and illustrate the applicability of the prediction information [2].

Jiong Yang performed a work," TrajPattern: Mining Sequential Patterns from Imprecise Trajectories of Mobile Objects". Author is only able to obtain the imprecise location of a mobile object at a given time. Sequential patterns are a popular data-mining model [3]. Gyozo Gid´ofalvi performed a work," Mining Long, Sharable Patterns in Trajectories of Moving Objects". This paper presents a database projection based method for efficiently extracting such long, sharable frequent routes [4]. Chin-Feng Lee performed a work, "exploiting data mining techniques to generate prefetching mechanism and broadcasting strategies in mobile computing environment". In this paper, Author will develop a cyclic sequential mining to discover a set of location-based cyclic sequential patterns (LBCS) which are frequently requested by a number of mobile users over time.[5] Na Yao performed a work "Managing Moving Congestion Patterns in Mobile Networks". Managing congestion is essential to maximize traffic carried in a mobile network and in this paper a technique is presented that uses learning to co-operatively change antenna patterns across a cluster of cells, so minimizing blocking. Moreover, the technique allows the changing radiation patterns to track congestion as it moves [6]. Po-Ruey Lei performed a work," Mining Spatial-Temporal Movement Profile of Mobile Users for Social-Aware Applications". In order to explore the community in their movement, movement behavior mining for individual user is a fundamental and essential task. To enhance the accuracy and conciseness of movement behavior modeling, in this paper, Author propose a spatial-temporal movement profile model (abbreviated as STMP) to capture movement behavior of objects. STMP is represented as a probabilistic suffix tree with spatial and temporal information of movements [7].

Shuai Ma performed a work," Combining Clustering with Moving Sequential Patterns Mining: A Novel and Efficient Technique". In this paper a novel and efficient technique is proposed to mine moving sequential patterns. Firstly the idea of clustering is introduced to process the original moving histories into moving sequences as a preprocessing step. And then an efficient algorithm, called PrefixTree, is presented to mine the moving sequences. Performance study shows that PrefixTree outperforms LM algorithm, which is revised to mine moving sequences, in mining large moving sequence databases [9].

Grzegorz Cielniak performed a work," Where is . . .? Learning and Utilizing Motion Patterns of Persons with Mobile Robots". This paper proposes a technique for learning collections of trajectories that characterize typical motion patterns of persons. Data recorded with laser-range finders is clustered using the expectation maximization algorithm. Based on the result of the clustering process Author derives a Hidden Markov Model (HMM). This HMM is able to estimate the current and future positions of multiple persons given knowledge about their intentions [10]. Yen-Ssu Chou performed a work," Mining User Movement Behavior Patterns in a Mobile Service Environment". In this paper, Author define the match join of mobile users U, movement locations L, staying time in timestamps T, and service requests S with weight w to be a subset of the w-join of U, L, T, and S such that each tuple of U, L, T, and S contributes to at least one result tuple. [11].

III. **PROPOSED APPROACH**

In this proposed work we are using the one of the most efficient approach for DNA sequencing i.e. Inverted List Approach. According to this approach to perform the pattern matching we build a temporary data structure in the form of Improved Inverted table. The data is maintained in this table in a particular sequence given by the user. It is a two dimensional typical table based organization in which row header represents the mobile nodes and the values in a row represent the next appearing node along with its occurrence number. Once the data is stored in this table it is capable to answer all the queries independent to the size of query.

The proposed work is about to find the most frequent moving pattern over the network so that we can find the nodes or the nodes pair that should get the maximum concern respective to the resource allocation. It means the node participating regularly over the network should get more resources. Here the term resource defines the time slice or the bandwidth of the network.

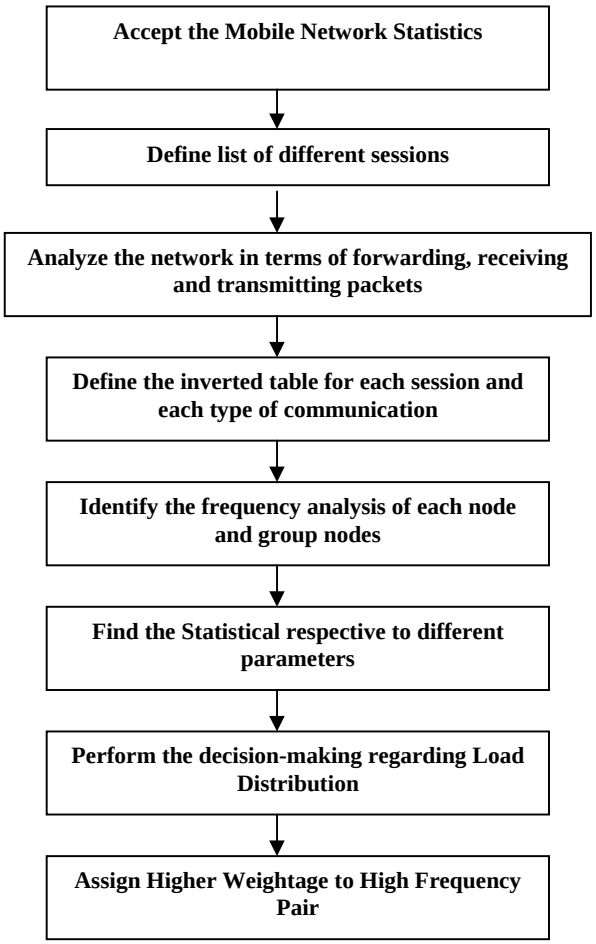

Figure 1 Proposed Flowchart

In this work the main concern is about to find the frequency of node participation over the network. Lot of work is done in the same direction. Here we are presenting the improved inverted table mechanism to find the most frequent nodes over the network. The method is introduced by K.V.S.R.P.Varma in year 2010. This approach is used by him to identify the similarity and frequency analysis in case of DNA sequencing. He performed the work to find the largest possible node sequence over the network. Lot of work is already done in terms of string extraction, string matching and pattern identification over the string.

Frequent Item set Mining plays an essential role in many data mining tasks and applications, such as mining association rules, correlations, sequential patterns, classification and clustering. Frequent item set construction has been a major research area over the years and several algorithms have been proposed in the literature to address the problem of mining association rules.

We are performing the same kind of pattern discovery in case of Mobile pattern identification. For this the improved inverted table approach is used. The complete work is divided in three basic steps

1. Identification of Node Sequence
2. Build the Inverted Table for the specific Node Sequence.
3. Frequent Pattern Identification

A) ***Identification of Node Sequence***

The node sequence is identified by analyzing the communication database of the complete network. We have collected this database from some secondary means that is used by some earlier researcher. Here we have assigned each node an alphabetical name like Node 1 =>A, Node 2 => B and so on. In this way we have find some sequence of visiting nodes such as we have 4 nodes A,B,C and D and one of the possible sequence is

ABABCABABCDABCDDADBDABADCBAC

B) Build the Inverted Table

Inverted matrix is the numerical representation of a string. The rows of the matrix represent the various characters present in the string and are indexed in the order in which they appear in the string. In this proposed we have taken a sequence

C) Frequent Pattern Identification

As the inverted table built, it is capable to answer all the frequency-oriented queries. We can find the occurrence of any of node or the node sequence by using inverted table. The main benefit of this approach is that the single inverted table is capable to answer the entire user query in terms of node sequence of any length.

IV. EXPERIMENTAL RESULTS AND ANALYSIS

We have taken a sequence of 25 nodes to 1000 nodes and communication between 4 nodes.

The overall design is user friendly. User can pass the node sequence manually from the database or it can be generated automatically. User can decide the number of nodes in the network. After passing the input, user has to input the node or the node sequence that he wants to search using proposed approach. Finally the result is shown in terms of frequency of node in this node sequence.

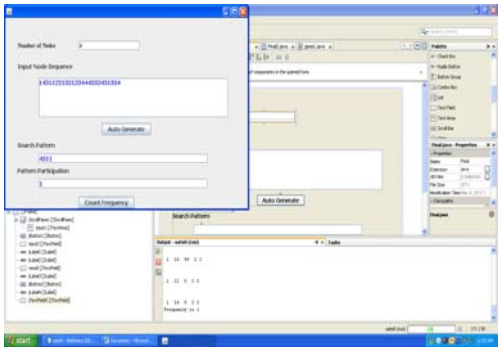

Figure 2: Mobile Pattern Search for Four Nodes and 25 Nodes Sequence

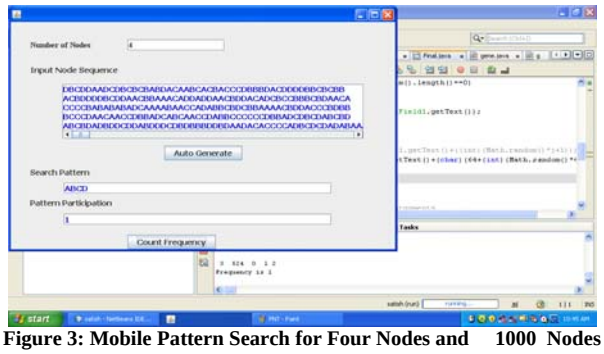

Figure 3: Mobile Pattern Search for Four Nodes and 1000 Nodes Sequence.

ANALYSIS

i) This system will provide information that will help any mobile company to analyze and remove the problem of congestion and starvation.

ii) This system is providing information about the maximum usage of resources by a user. Based on this information company can decide on allocation of resources optimally.

V. CONCLUSION

We are proposing an intelligent system in which each host will be monitor by the server respective to the communication and the contribution of the node or the node pair over the network. The proposed work is about to provide the resources in efficient way to all the mobile users. It means the users group having more interaction over the network will get the more benefit from the server side. The benefit is in terms of more available bandwidth or the time slot for the communication. The proposed analysis will remove the problem of congestion as well the starvation over the network.

VI. REFERENCES

[1]. Chih-Chieh Hung," Exploring Regression for Mining User Moving Patterns in a Mobile Computing System".
[2]. Karen H. Wang," Group Mobility and Partition Prediction in Wireless Ad-Hoc Networks".
[3]. Jiong Yang," TrajPattern: Mining Sequential Patterns from Imprecise Trajectories of Mobile Objects".
[4]. Gyozo Gid´ofalvi," Mining Long, Sharable Patterns in Trajectories of Moving Objects".
[5]. Chin-Feng Lee," EXPLOITING DATA MINING TECHNIQUES TO GENERATE PREFETCHING MECHANISM AND BROADCASTING STRATEGIES IN MOBILE COMPUTING ENVIRONMENT".
[6]. Na Yao," Managing Moving Congestion Patterns in Mobile Networks".
[7]. Po-Ruey Lei," Mining Spatial-Temporal Movement Profile of Mobile Users for Social-Aware Applications".
[8]. Grzegorz Cielniak," People Recognition by Mobile Robots".
[9]. Shuai Ma," Combining Clustering with Moving Sequential Patterns Mining: A Novel and Efficient Technique".
[10]. Grzegorz Cielniak," Where is . . . ? Learning and Utilizing Motion Patterns of Persons with Mobile Robots".
[11]. Yen-Ssu Chou," Mining User Movement Behavior Patterns in a Mobile Service Environment".
[12]. Tun-Hao You," Protecting Moving Trajectories with Dummies".
[13]. Andrei Marculescu," Efficient Tracking of Moving Targets by Passively Handling Traces in Sensor Networks".
[14]. Joachim Gudmundsson," Movement Patterns in Spatio-Temporal Data".
[15]. Teerayut Horanont," An Implementation of Mobile Sensing for Large-Scale Urban Monitoring".
[16]. Karen H. Wang," Group Mobility and Partition Prediction in Wireless Ad-Hoc Networks".
[17]. Wen-Chih Peng," Developing Data Allocation Schemes by Incremental Mining of User Moving Patterns in a Mobile Computing System", IEEE TRANSACTIONS ON KNOWLEDGE AND DATA ENGINEERING
[18]. Wen-Chih Peng," Allocation of Shared Data based on Mobile User Movement".