Tracking Moving Object using WSN and Compression

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Abstract— Studies in location-acquisition technologies, such as and wireless sensor networks (WSNs) and global positioning systems (GPSs), have fostered many novel applications like object tracking, environmental monitoring, and location-dependent service. These applications generate a huge amount of location data, and hence lead to transmission and storage challenges, especially in resource constrained environments like WSNs. To reduce the data volume, various algorithms have been proposed for data compression and data aggregation. However, the above works do not approach application-level semantics, such as the group relationships and movement patterns, in the location data. Natural phenomena show that many creatures from large social groups and move in regular patterns. However, previous works focus on finding the movement patterns of each single object or all objects. In this paper first propose an efficient predict, next algorithm to jointly identify group of moving objects and discover their movement patterns in wireless sensor networks. Then we propose compression algorithm known as merging algorithm to merge and compress the location data of group of moving objects.

Key words: WSNs, GPSs, Merging Algorithm, Moving Objects.

I. INTRODUCTION

In object tracking applications, many natural phenomena show that objects often follow some kind of regularity in their movement pattern. For example, the famous annual wildebeest migration demonstrates that the movements of creatures are temporally and spatially correlated.

Biologists also have found that many animals, such as elephants, lions, zebra, tigers, whales, and birds, form large social groups while they migrate for wintering, or breeding or finding food. These characteristics show that the path data of multiple objects may be related for biological applications.

However, some research areas, such as the study of animals' social behavior and wildlife migration are more focused with the patterns of movement of groups of animals, not individuals; so, tracking of each and every object is not necessary in such cases.

This gives a new idea of finding moving animals forming the same group and identifying their combine group movement patterns. Therefore, assuming that objects having same movement pattern are considered to be in the same group, we define the moving object clustering problem as given the movement trajectories of objects, forming the groups in such a way that the objects are not over lapped and hence minimize the number of groups.

Then, group movement pattern discovery is finding the most representative patterns of movement regarding each group of objects, which can further be utilized to compress data of the location. Considering the past works, such as similarity measuring in the entire path sequences in group moving objects.

Since objects may be held together in some types of region, such as gorges, and commonly distributed in less rugged areas, their relationships of the groups are obvious in some areas and not definite in others. Thus, approaches that performing clustering among whole paths may be unable to identify the relationships in local group.

In addition, most of the above works are centralized algorithms where it is needed to collect the data to a server even before processing the data. Thus, this may deliver the data that is redundant and not necessary and this may lead in more power consumption due to transmission of data as it needs more power compared to data processing in WSNs. So we call the problem of compressing the location data of a group of moving objects as the group data compression problem.

II. EXISTING SYSTEM

Discovering the group movement patterns is more difficult than finding the patterns of a single object or all objects, because we need to jointly identify a group of objects and discover their aggregated group movement patterns. The constrained resource of WSNs should also be considered in approaching the moving object clustering problem. However, few of existing approaches consider these issues simultaneously. On the one hand, the temporal-and-spatial correlations in the movements of moving objects are modeled as sequential patterns in data mining to discover the frequent movement patterns . However, sequential patterns

1) Consider the characteristics of all objects.
2) Lacks information about a frequent patterns significance regarding individual trajectories.
3) Carry no time information between consecutive items, which make them unsuitable On the other hand, previous works, such as measure the similarity among these entire trajectory sequences to group moving objects. Since objects may be close together in some types of terrain, such as gorges, and widely distributed in less rugged areas, their group relationships are distinct in some areas and vague in others. Thus, approaches that perform clustering among entire trajectories may not be able to identify the local group relationships. In addition, most of the above works are centralized algorithms which need to collect all data to a server before processing. Thus, unnecessary and redundant data may be delivered, leading to much more power consumption because data transmission needs more power than data processing in Wireless Sensor Networks (WSNs).

III. PROPOSED SYSTEM

In this paper, we first introduce our object sensor algorithm to approach the moving object problem and discover group movement patterns. Then, based on the discovered group movement patterns, we propose a novel compression algorithm to tackle the group data compression problem. The compression algorithm further leverages the correlations of multiple objects and their movement patterns to enhance the compressibility, we call this as sequence merge phase. In the sequence merge phase, we propose a Merge algorithm to merge and compress the location data of a group of objects. The Replace algorithm finds the optimal solution and guarantees the reduction of entropy, which is conventionally viewed as an optimization bound of compression performance. As a result, our approach reduces the amount of delivered data and, by extension, the energy consumption in WSNs.

Our contributions are:

1) Different from previous works, we formulate a moving object clustering problem that jointly identifies a group of objects and discovers their movement patterns. The results obtained are useful for various applications, such as data storage and transmission, task scheduling, and network construction.
2) We propose a novel compression algorithm to compress the location data of a group of moving objects with or without loss of information. We formulate the HIR problem to minimize the entropy of location data and explore the Shannon's theorem to solve the HIR problem. We also prove that the proposed compression algorithm obtains the optimal solution of the HIR problem efficiently.

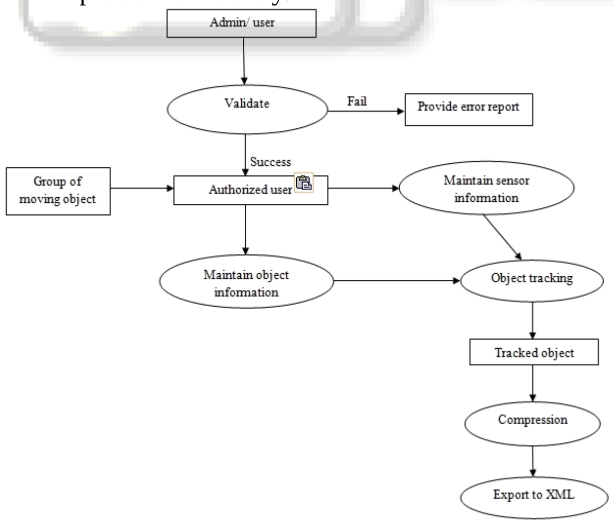

Fig. 1: Data Flow Diagram

IV. LITERATURE SURVEY

A. Distributed Compression

The distributed nature of the sensor network architecture introduces unique challenges and opportunities for collaborative networked signal processing techniques that can potentially lead to significant performance gains. Many evolving low-power sensor network scenarios need to have high spatial density to enable reliable operation in the face of component node failures as well as to facilitate high spatial localization of events of interest. This induces a high level of network data redundancy, where spatially proximal sensor readings are highly correlated. In this article, a new way of removing this redundancy in a completely distributed manner, i.e., without the sensors needing to talk to one another. The constructive framework for this problem is dubbed DISCUS (distributed source coding using syndromes) and is inspired by fundamental concepts from information theory. In this article, the main ideas, provide illustrations, and give the intuition behind the theory that enables this framework.

B. Data Compression in Multi-Host Sensor Network

We consider a problem of broadcast communication in a multi-hop sensor network, in which samples of a random field are collected at each node of the network, and the goal is for all nodes to obtain an estimate of the entire field within a prescribed distortion value. The main idea we explore in this paper is that of jointly compressing the data generated by different nodes as this information travels over multiple hops, to eliminate correlations in the representation of the sampled field. Our main contributions are: (a) we obtain, using simple network flow concepts, conditions on the rate/distortion function of the random field, so as to guarantee that any node can obtain the measurements collected at every other node in the network, quantized to within any prescribed distortion value; and (b) we construct a large class of physically-motivated stochastic models for sensor data, for which we are able to prove that the joint rate/distortion function of all the data generated by the whole network grows slower than the bounds found in.

C. A New Perspective on Trajectory Compression Techniques

Positioning technology is rapidly making its way into the consumer market, not only through the already ubiquitous cell phone but soon also through small, on-board positioning devices in many means of transport and in types of portable equipment. It is thus to be expected that all these devices will start to generate an unprecedented data stream of time- stamped positions. Sooner or later, such enormous volumes of data will lead to storage, transmission, computation, and display challenges. Hence, the need for compression techniques. Previously some work has been done in data compression for GIS and mainly in line generalization considering two dimensional data. However, time-stamped positions data do not form a line, as they are historically traced points. On the other hand, researches in compression for time series data mainly deal with one dimensional time series and are good for short time series and in absence of noise.

V. CONCLUSION

In this work, we explore the characteristics of group movements to discover the information about groups of moving objects in tracking applications. With the explored information, we propose the Sequence Merge

Phase. In the sequence merge phase, we propose the Merge algorithm to merge the sequence of the location of a group of moving objects with the intention of reducing the overall sequence length. Our experimental results show that this compression algorithm reduces the amount of delivered data effectively and enhances compressibility.

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