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RESEARCH ARTICLE

Nearest Neighbor Query in Location-Aware Mobile Ad-Hoc Network

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Abstract-- Nearest Neighbor Query in Location-aware focused on routing protocols to support communications among mobile nodes connected to each other by one-hop/multi-hop links. ESKNN methods both reduce the traffic required for processing KNN queries. And it achieves both reduction in traffic and accuracy of the query result. In the EXP method, circle to circle formation. In the SPI method, Node to Node formation in a spiral manner and the node that collects a satisfactory ESKNN result transmits the result to the query-issuing node. We proposed the integration of EXP & SPI method using KNN which integrates query propagation with data collection along a well-designed itinerary traversal.

Keywords— MANETs, query, Explosion, spiral, locations-based service

I. Introduction

The characteristics of MANET are notable, because of the limitations on network bandwidth, and dynamic topology change due to the movement of mobile nodes. When the mobile nodes frequently exchange beacon messages to accurately know changing locations of neighboring nodes, traffic increases, and this leads to frequent packet losses, which results decrease in accuracy of the query result. On the other Hand, traffic is reduced, when nodes do not frequently exchange beacon messages, but

nodes cannot accurately know the neighboring nodes' locations information. KNN query processing techniques assume location data are available in a centralized database and focus on improving the index performance. The KNN query processing method for maintain traffic and of the query result in mobile ad-hoc network. Dynamic adjustment of the KNN boundary has also been addressed to cope with spatial irregularity and mobility of ad-hoc nodes. In this paper, we propose two KNN query processing methods for reducing traffic and maintaining high accuracy of the query result in MANETs.

II. Related Work

Many strategies have been proposed for processing kNN queries in WSNs K-Nearest Neighbor (KNN) query that facilitates collection of sensor data samples based on a given query location and the number of samples specified (i.e., K). Recently, itinerary-based KNN query processing techniques, which propagate queries and collect data along a predetermined itinerary, have been developed. Prior studies demonstrate that itinerary-based KNN query processing algorithms are able to achieve better energy efficiency than other existing algorithms developed upon tree-based network infrastructures. However, how to derive itineraries for KNN query based on different performance requirements remains a challenging problem. [3]. In our paper, we focus on some of the most relevant existing studies on WSNs involving features similar to MANETs, such as wireless communication and multi-hop relaying, and discuss the differences in our approach. In [5,6,7], the authors proposed an infrastructure-free kNN query processing method called PCIKNN which consists of phases same as DIKNN. This method also sets the kNN boundary and partitions it into some sectors[8,9]. With respect to each sector, a sensor node collects partial results along a well-devised itinerary structure, and then, the last node in each sector sends back the information on the nodes in each sector to the nearest node from the query point [2,9].After the nearest node from the query point receives the information on nodes in all sectors, it aggregates the partial results and sends them back to the query-issuing node. In DIKNN and PCIKNN, by partitioning the search range, the response time of query execution can be reduced even if the search range is large.

As described later, to process a kNN query without beacons, a node must process it on the fly using only the information included in a query and its location information. In addition, it is necessary to search the entire range where kNNs are present, and to identify the conclusion of a search based solely on the information in a query. Our proposed methods are more suitable to the MANET environments, because we have designed methods to meet these requirements. In [6], the authors proposed three methods for processing kNN queries in location-aware sensor networks: the GRT, KBT and IKNN algorithms. In the GRT and KBT algorithms, a tree infrastructure composed of sensor nodes is constructed, and a kNN query is propagated along it. The IKNN algorithm is an infrastructure-free approach, which propagates a query along a calculated spiral route.

III. EXISTING SYSTEM

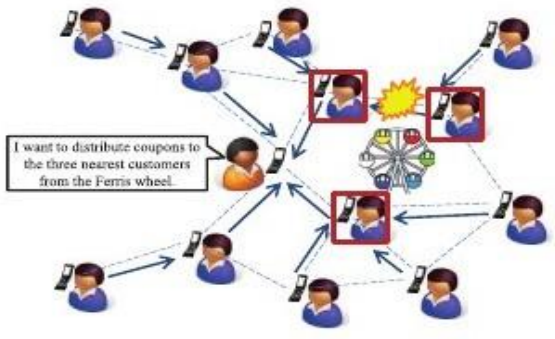
In our existing System, The centralized approach performs the queries in a centralized database containing locations of all the sensor nodes. The in-network approach propagates the query directly among the sensor nodes in the network and collects relevant data to form the final result. However, in this approach, many unnecessary replies, not included in the result of the kNN query (kNN result), are sent back to the query-issuing node, and thus traffic increases. This is because when the network topology changes during query execution, the query-issuing node may not be able to acquire all the information on KNNs. In addition, it is necessary to search the entire range where KNNs are present, and to identify the conclusion of a search based solely on the information in a query. Our proposed methods are more suitable to the MANET environments, because we have designed methods to meet these requirements.

Existing System disadvantages:

- It is difficult to achieve perfect accuracy of the query result because nodes move freely, which causes variations in distance between node locations and the query point.
- Nodes frequently exchange beacon messages to accurately know changing locations of neighboring nodes, traffic increases, and this causes frequent packet losses, resulting decrease in the accuracy of the query result.

IV. PROPOSED SYSTEM

EXP & SPI method using KNN integrates query propagation with data collection along a well-designed itinerary traversal. Dynamic adjustment of the KNN boundary has also been addressed to cope with spatial irregularity and mobility of sensor nodes in MANET.In MANETs, it is highly important to minimize unnecessary query messages and replies (i.e., traffic). The proposed effective KNN query processing methods for reducing traffic while preserving high accuracy of the query result. We propose two different methods, the Explosion (EXP) method and the Spiral (SPI) method. Through extensive simulations, we show that our methods can reduce traffic compared with the naïve method and the beacon-based (periodic message exchanges) method, and also achieve high accuracy of the query result. The proposed methods both reduce the traffic required for processing KNN queries, in comparison with naive and existing methods using beacons, and achieve high accuracy of the query result. The EXP method can achieve both reduction in traffic and high accuracy of the query result at any levels of node density.



ESKNN query processing

Proposed System advantages:

- It reduces query response time.
- It reduces the traffic required for processing kNN queries.
- And it preserving high accuracy of the query result.

V. Implementation

A. Node Initialization

Any system or device connected to a network is also called a node. Each device on the network has a network address, such as a MAC address, which uniquely identifies each device. Data is being transferred to and from on the network.

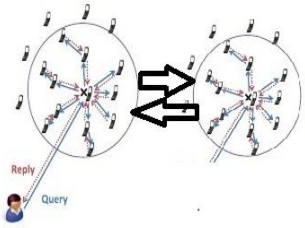
B. Geo Routing Method

Geographic routing (also called geo routing or position-based routing) is a routing principle that relies on geographic position information. It is mainly proposed for wireless networks and based on the idea that the source sends a message to the geographic location of the destination instead of using the network address. Geographic routing requires that each node can determine its own location and that the source is aware of the location of the destination. With this information a message can be routed to the destination without knowledge of the network or a prior route discovery. There are various approaches, such as single-path, multi-path and flooding-based strategies). Most single-path strategies rely on one technique: greedy forwarding. Greedy forwarding tries to bring the message closer to the destination in each step using only local information.

C. EXP / SPI Method

EXP Method

- The EXP method can achieve both reduction in traffic and high accuracy of the query result at any levels of node density.
- Each node that receives the reply message (from its EXP child) updates the tentative *K*NN result included in the reply message, by adding the information on itself.



EXP method

SPI Method

- The SPI method can achieve high performance in an environment with high node density, though it does not perform well in a sparse environment.
- Initial stipulation of a search range is not needed.

  Queries can search nodes in order of increasing distance from the node's location to the query point. The node which acquires kNNs appropriately initiates a reply to the query-issuing node.

D. Forwarding the process using Query Algorithm

Query processing in opportunistic network would incur some time delay or even failure of processing due to the opportunistic style of communication. The key idea of PBQ is to cut off the time delay and improve the success rate of query processing through proper selection of relay nodes and controlling the amount of forwarding messages based on the query priorities. Meanwhile, query priorities are adjusted dynamically so that the query results could be forwarded back to the source node of the query quickly and the residual query request messages could be cleaned up from the network, saving lots of unnecessary transmissions and improving the overall utility of query processing.

E. Analysis And Estimating the Query Process

Transmits a *K*NN query message to the nearest node from the global coordinator, using the geo routing method described in the query message, the query-issuing node's ID and location are set as *Ms* and its location, respectively, the requested number of *K*NN, the radius of the estimated *K*NN circle is set as *R*, and the query point is set as the location specified by the query.

VI. CONCLUSION

Thus ESKNN methods both reduce the traffic required for processing KNN queries. And it achieves both reduction in traffic and accuracy of the query result. The Exp, SPI and ESKNN method can be used in this MANET. This is advantageous to the EXP method, which determines the radius of the estimated KNN circle, R, based on the density of nodes over the entire area. Performance evaluation in an environment with skewed node distribution will figure in our future work.

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