



Literature Survey on K Nearest Neighbor Queries in Mobile Networks

KEYWORDS

Mobile ad hoc networks, beaconless method, global coordinator, neighboring nodes, geo – routing.

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ABSTRACT

Wireless Sensor networks play an important role in distributed infrastructure and proposed for various monitoring applications over a wide geographical region. Location Based Service is a typical application in MANET, Which retrieves the information on the nearest K nodes from the location specified by the query. All user nodes to simultaneously broadcast safety messages to all their neighbors within transmit range by using beacon-less KNN query processing methods in MANET over high traffic. But it does not perform well in scattered environment. KNN focused on reducing traffic and maintaining high accuracy in sensor networks. In this survey paper, compare various research parameters for reducing traffic and maintaining high accuracy and the techniques used in it. The study papers were effective to understand the techniques and gives ideas to propose an innovative model for achieving high accuracy of the query result in the MANET.

I.INTRODUCTION

Location Based Service (LBS) is a typical application in Mobile Ad Hoc Networks (MANET). It searches the information on the k nearest neighbors from the specified location. In MANET it is important to minimize the amount of information transmitted due to network bandwidth. If nodes frequently exchange beacon messages, kNN can be achieved high accuracy of the query result, because nodes can accurately know the information on their neighbors but involves more traffic. So it is desirable to retrieve kNN information using beacon-less methods in Mobile Ad Hoc Networks (MANET).

In beacon-less methods, nodes cannot know the neighboring nodes information beforehand [1]. So it should avoid message over the entire network because it is particularly wasteful use of network bandwidth. A node must process a query in a distributed manner using only the information included in the query and its location information and node must cooperate with neighbors to process a query with low traffic. By the use of proposed model, the query processing which focus on search, achieve better efficiency than other methods and avoids all the associated drawbacks [2][5][10]. Using geo-routing method the query issuing node transmits a kNN query to the nearest node from the query point (global coordinator). Implement two different approaches, the Explosion (EXP) and Spiral (SPI) methods. In both methods, nodes cooperate with neighbors to process a query using only the information included in the query and its location information.

In explosion method the nearest node from the query point forwards the query to the other nearest nodes within a specified circular region and corresponding node will receiving the replies. In the spiral method the nearest node from the query point forwards the query to the nearest node in spiral manner, and the node that collects a kNN result transmits the result to the query issuing node. In explosion method the global coordinator floods the kNN query to nodes within a specific circular region centred on the query point. The size of the circular region is determined based on the density of the nodes in the entire area. In spiral method the entire area is dynamically partitioned into a set of hexagonal cells its size is based on the

communication range of the mobile nodes. In proposing system, combine the above two methods, it will give better performance in query result and avoid traffic.

DESCRIPTION OF THE PAPER

The layout of the paper is as follows. In section II, address the above mentioned techniques and also give a brief on the literature being reviewed for the same. Section III, presents a comparative study of the various research works explored in the previous section. Section IV, describes about future work. Section V gives the conclusion in and lastly provides references.

II.RELATED WORK

In this paper [1] P2P query processing has attracted a growing interest number of location-aware applications such as answering kNN queries in mobile ad hoc networks. In this research, the authors propose a pure mobile P2P query processing scheme which primarily focuses on the search and validation algorithm for kNN queries. The proposed system is developed for pure mobile P2P environments with the absence of the base station support. The system can reduce energy consumption more than six times by making use of data sharing from peers in a reasonable mean latency of processing time for networks with high density of moving objects. But the main disadvantage is not providing high security.

In this paper [2] the authors propose an efficient and scalable query processing framework for continuous spatial queries in peer-to-peer (P2P) environments has no fixed communication infrastructure. The mobile P2P environment has limited communication range. They design two key features are

(1) Each mobile user can identify the desired Quality of Services (QOS) for query answers in a personalized QOS profile; it consists of two parameters, namely, coverage and accuracy. The both parameter indicates the desired level of completeness and accuracy of the approximate answer. (2) Continuous answer maintenance scheme to enable the user to collaborate with other peers to continuously maintain the query answer. With these two features, the user can obtain a query answer from the local cache

if the answer satisfies the QOS requirements. The results show that the framework is efficient and scalable in terms of performance tradeoff between the communication overhead and the quality of query answers.

In this paper [3] sensor networks represent an important component of distributed infrastructure supplying raw data to various applications. The author proposes the use of mobile data collectors that represents K-NN queries as a cost-efficient approach to collect data within the sensor network. They propose a cost-efficient 3D-kNN algorithm that uses minimal energy and communication overheads to compute k-nearest neighbor. Authors propose a cost-efficient kNN boundary estimation algorithm that computes kNN boundary based on network density. They simulate the proposed 3D-KNN algorithm using Glomosim and validate its cost efficiency by evaluating its energy efficiency and query latency.

In this paper [4] wireless sensor networks have been proposed for facilitating various monitoring applications. In these applications, spatial queries that collect data from wireless sensor networks. The important one is k-Nearest Neighbor (kNN) query that gives collection of sensor data samples based on a given query location and the number of samples specified (i.e., K). The itinerary-based kNN query processing algorithms are able to achieve better energy efficiency than other existing algorithms developed in network infrastructures. A Parallel Concentric-circle Itinerary-based KNN (PCIKNN) query processing technique that derives different itineraries by optimizing either query latency or energy consumption.

In this paper [5] the in-network query processing paradigm in sensor network postulates that a query is routed among sensors and collects the answers from the sensor. The authors propose a query processing method that uses cooperative caching, the MARKET algorithm for querying mobile P2P database and includes a novel strategy for a mobile peer to prioritize the reports based on their relevance reports. Simulations based on real-life mobility traces identify the situations in which this approach outperforms a series of existing cooperative caching strategies and an existing mobile sensor network algorithm.

In this paper [6] Wireless sensor networks have been widely used in civilian and military applications. It mainly designed for monitoring purposes, limited power supply is the major problem. So this paper is focusing on continuous kNN query processing in object tracking sensor networks. The authors propose a localized scheme to monitor nearest neighbors to a query point. The main idea is to establish a monitoring area for each query from that updates relevant to the query are collected. They analyze the optimal maintenance of the monitoring area and develop an

adaptive algorithm to that desired area. It greatly reduces energy consumption and prolongs network lifetime. The disadvantage is not well in large scale environments.

In this paper [7] the authors propose a maintenance-free itinerary-based approach called Density-aware Itinerary KNN query processing (DIKNN). It divides the search area into multiple cone-shape areas centered at the query point. The design of the DIKNN scheme takes into account several challenging issues between degree of parallelism, network interference and mobility of sensor nodes. This model is validated by extensive simulations. The results show that DIKNN yields better performance and scalability when compared with other methods.

In this paper [8] the authors propose an infrastructure-free window query processing technique for sensor networks and also called itinerary-based window query execution (IWQE). It combines the query propagation and data collection into one single stage and executed along a well-designed itinerary inside a query window. Existing techniques are very vulnerable to network dynamics. The proposal IWQE, conducts query propagation and data collection along a well-designed itinerary in various systems, it does not require the support of a network infrastructure.

In this paper [9] Routing in mobile ad-hoc networks with a large number of nodes with high mobility is a very difficult task. The Beacon-Less Routing Algorithm (BLR) is a routing protocol that makes use of location information to reduce routing overhead. It does not require nodes to broadcast beacon messages and it avoids all the associated drawbacks in the network performance. The analytical results indicate that BLR is most appropriate for large networks and provides efficient and robust routing in mobile ad-hoc networks. The proposed BLR routing protocol avoids any beaconing mechanism. It operates on the actual topology and its performance is almost independent of the node mobility. The analytical results give better performance of BLR.

In this paper [10] Location-based applications require constant monitoring of k-nearest neighbor (k-NN) queries over moving objects within a geographic area. Existing approaches is focused on predictive queries and result that the trajectories of the objects are measurable at query processing time. They presented an analysis of two proposed approaches query-indexing and object indexing. They have analyzed the results presented extensions of the basic methods to handle non-uniform data efficiently and conducted a variety of experiments to explore the benefits of our approach in a variety of parameter settings.

III. COMPARATIVE STUDY

In this section analyzed the various research works on several parameters and presented their comparison in the table below.

TABLE 1. COMPARISON OF VARIOUS RESEARCH WORKS

S.N	Title	Author	Issue	Method Used	Tools	Advantage & Disadvantage
1.	A pure peer-to-peer approach for kNN query processing in mobile ad hoc networks.	T.P. Nghiem, A.B. Waluyo, and D. Taniar	More energy consumption in data sharing from p2p environments	Validation algorithm	Data	Advantage: Reduce energy consumption in data sharing. Disadvantage: The proposed query processing scheme is not suitable in high density of moving objects.

2.	On efficient and scalable support of continuous queries in mobile peer-to-peer environments.	C.Y. Chow, M.F Mokbel, and H. V. Leong	Mobile p2p environment has limited communication range	Baseline algorithms	Spatial queries	Advantage: Good performance in communication range, quality in query answers. Disadvantage: This framework cannot support for other spatial queries.
3.	Cost-efficient data collection approach using K-nearest neighbors in a 3D sensor network.	P.P. Jayaraman, A.Zaslavsky, and J. Delsing	Supply data in distributed environment is difficult.	3D KNN algorithm	queries	Advantage: Minimal energy consumption. Disadvantage: Not suitable for sparse environment.
4.	Parallelizing itinerary-based KNN query processing in wireless sensor networks.	T.Y. Fu, W. C. Peng, and W. C. Lee	Traditional KNN processing techniques are infeasible for wireless sensor networks.	PCIKNN	Sensor nodes	Advantage: High accuracy in query result. Disadvantage: Difficult to estimate a search boundary covered by derived parallel itineraries.
5.	In-network query processing in mobile P2P databases.	B. Xu, F. Vafaei, and O. Wolfson	Mobile sensor of network does not satisfy different approach	MARKET algorithm	Parameters	Advantage: Minimize response time of reports. Disadvantage: Due to space limitations, MARKET cannot be used to produce algorithms for network process.
6.	Localized monitoring of kNN queries in wireless sensor networks.	Y.Yao, X.Tang, And E.P.Lim	Limited power supply	Adaptive algorithms	queries	Advantage: It greatly reduces energy consumption and prolongs network lifetime. Disadvantage: It is not well in large scale environments.
7.	Toward the optimal itinerary-based KNN query processing in mobile sensor networks.	S.H. Wu, K.T. Chuang, C.M. Chen, and M.S. Chen	Network interference, Mobility of sensor nodes	DIKNN algorithm	Sensor nodes	Advantage: Better performance Scalability is high. Disadvantage: Estimation of search radius and design efficient itinerary is difficult.
8.	Processing window queries in wireless sensor networks.	Y.Xu, W.C.Lee, J. Xu, and G.Mitchell	Existing techniques are very vulnerable to network dynamics.	IWQE	GRT, MBR, wq	Advantage: Reduce query latency, Avoids message collisions. Disadvantage:
10.	Monitoring k-nearest neighbor queries over moving object.	X. Yu, K. Q. Pu, and N. Koudas	Do not make any assumption on trajectories of objects, so time delay in answering query.	Object indexing and query indexing algorithms.	objects	Advantage: Highly dynamic data. Fast maintenance Disadvantage: These algorithms are not applied in spatial moving objects.
						support for unicast packets.

IV. FUTURE WORK

The case study was very useful to understand the techniques.

It is well understood that how the techniques are used in KNN query processing in mobile sensor networks.

Query issuer

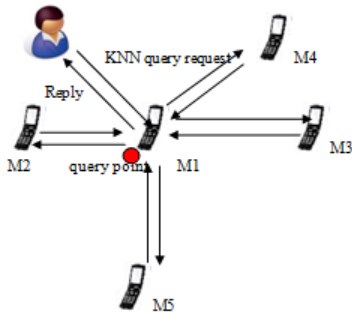


Figure1.Forward kNN query to nearest neighbors

Query issuing node first forward a kNN query using geo-routing to the nearest node from the query point then nearest node from the query point forwards the query to other node it close to the query point and each node receiving the query replies with the information on itself and techniques such as Explosion and Spiral methods are combined and applied on it. The figure 1 shows that how to forward the queries from query issuer then reply back to a corresponding nodes.

V. CONCLUSION

In this paper, literature survey on KNN query processing was useful to understand the techniques used and how to receive information from desired nodes with low traffic in MANET. The fundamental approach is to reduce traffic and achieve high accuracy of the query result by applying any one the mentioned methods, Explosion (EXP) method or Spiral (SPI) method. Case study is helped to implement the proposed model. The proposed method combination of explosion and spiral method is used to broadcast safety messages to all their neighbors within transmit range by reading concern papers.

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