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RESEARCH ARTICLE

A STUDY ON PATH AND DISTANCE BASED QUERY PROCESSING IN MOBILE SYSTEMS

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Abstract- Digital ecosystem, inspired by natural systems, is an open area in recent research works, and it is a system with self-organization, scalability, and attainability capacities. A distributed wireless mobile network that serves as the underlying infrastructure to digital ecosystems provides important applications to the digital ecosystems, two of which are mobile navigation and continuous mobile information services. Spatial networks consisting of geospatial objects and paths that link the objects kind a digital scheme within the context of geoinformatics. With the recent development of mobile devices using cheap wireless networks, applications to access interest objects and their methods within the abstraction world have gotten additional in demand. To introduce the idea of path-based k nearest neighbor (pkNN). Given a group of candidate interest objects, a question purpose, and therefore the variety of objects k, pkNN finds the shortest path that goes through all k interest objects with the minimum shortest distance among all attainable methods. pkNN is useful once users would really like to go to all k interest objects one by one from the question purpose, in which pkNN can provide the users the shortest path.

Index Terms - Query Processing; Digital Organisms; k Nearest Neighbor

I. INTRODUCTION

A spatial road network in mobile systems can be traded as a small digital ecosystem, as in spatial road networks, interest points are objects, and paths link the objects. There is a strong interconnection between objects and paths, and finding certain paths satisfying users queries is critical to many applications. Traditional queries in spatial databases are range search and k nearest neighbor (NN)(kNN) search. Range search is to find all interest objects within a predefined range, while kNN search is to find k interest objects which are the closest to the query point. Both range and kNN searches provide users the candidate set of interest points and allow users to choose any one in the set because they have been previously filtered by users' conditions. Range search cannot be used as there is no fixed range. kNN search cannot be used either, as after we visit the first interest point, the user may not want to return to the query point and go to the second one.

Inspired by the ecological systems in nature, whereby organisms form a dynamic and interrelated complex ecosystem. Digital ecosystems are formed by "digital organisms" in complex, dynamic, and interrelated ecosystems. Hence, a digital ecosystem is an open, loosely coupled, domain-clustered, and demand-driven ecosystem, which uses multiple technologies to provide cost-efficient digital services and value-creating activities. One of the main technologies in a digital ecosystem is the distributed wireless mobile network that allows information exchange and information services to be delivered, which is required for digital ecosystems. An application that utilizes such a technology is the information service to mobile devices and users through mobile networks. Mobile information services transcend the traditional centralized wired technology into an interactive wireless environment to offer cost-effective digital services and value-creating activities for mobile users.

Reverse nearest neighbor (RNN) search has received considerable attention from the database research community in the past few years, due to its importance in a wide spectrum of applications such as decision support profile-based marketing resource allocation ,etc. Given a set of data points P and a query point q in a multidimensional space, an RNN query finds the points in P that have q as their nearest neighbor (NN). A popular generalization ofRNNis the reverse k-nearest neighbor (RkNN) search, which returns the points in P whose k NNs include q. There are many RNN/RkNN query algorithms that have been proposed in the database literature. Basically, they can be classified into three categories: 1) precomputation-based algorithms 2) dynamic algorithms and 3) algorithms for various RNN/RkNN query variants.

With the development of the motor industry and mobile communication technology, more drivers use Global Positioning System (GPS) to replace the traditional printed map. Then multifarious query processing methods were proposed for satisfying different requirement on GPS; Range search and k nearest neighbours are two kinds of queries used in common. Range search derived from R-tree index in 1984 and after that many advance approaches were proposed to solve the same problem more efficiently not only on Euclidean distance, but also on network distance, such as, R+-Tree, R*-Tree and RER/RNE.

But all these approaches process range search at a given point. For moving users, these existing methods are not adequate. Another aspect of research in spatial and mobile databases, k nearest neighbour (KNN) has been proposed. After an extensive research, some researchers change their interests from Geographical Information Systems (GIS) to Mobile navigation, so many approaches for Continuous KNN have been proposed. But these approaches which retrieve k nearest neighbour for moving users are incapable for continuous range search, because most KNN approaches are constructed based on the competition of a set of entities of interest, while the range search results only concern the range and the entities of interest within this range.

Reverse Nearest Neighbor (RNN) search problem has received a lot of attentions from the database research community for its broad application base such as marketing, decision support, resource allocation, and data mining since its introduction.. Given a set of data points P and a query point q in a multidimensional space, RNN query finds every data point in P with q as its nearest neighbor (NN). Such RNN query is also called monochromatic RNN since the answer data points and their NNs are all from the same set of data points, i.e., P.1 On the other hand, bichromatic RNN searches answer data points from one set of data points, P, with their NNs taken from another set of data points, say Q Reverse k-NN (RkNN) with k>= 1 generalizes RNN to find data points whose kNN include q. RkNN query is different from (and even more complicated than) kNN query because of asymmetric NN relationship between two data points in a data set. The primary goal of RkNN query is to determine the influence set, i.e., a subset of data points in P considered to be influenced by a given query point q if q is the immediate NN to them.

II.LITERATURE SURVEY

2.1.VORONI BASED CONTINUOUS k NEAREST NEIGHBOR SEARCH IN MOBILE NAVIGATION

Digital ecosystems are formed by "digital organisms" in complex, dynamic, and interrelated ecosystems and utilize multiple technologies to provide cost-efficient digital services and value-creating activities. A distributed wireless mobile network that serves as the underlying infrastructure to digital ecosystems provides important applications to the digital ecosystems, two of which are mobile navigation and continuous mobile information services. Most information and query services in a mobile environment are continuous mobile query processing or continuous k nearest neighbor (CKNN), which finds the locations where interest points or interest objects change while mobile users are moving.

These locations are known as "split nodes." All of the existing works on CKNN divide the query path into segments, which is a segment of road separated by two intersections, and then, the process to find split nodes is applied to each segment. Since there are many segments processing each segment is naturally inefficient. An alternative solution to overcome this problem. Use the Voronoi diagram for CKNN [called Voronoi CKNN (VCKNN)]. This approach does not need to divide the query path into segments, hence improving the overall query processing performance. This experiment verified the applicability of the VCKNN approach to solve CKNN queries.

One of the most prominent and growing applications of mobile information services is mobile navigation , due to the increase of traffic loads and the complexity of road connections. More and more mobile users need a kind of application that will help them navigate on crowded roads, guide them to the best route, and even give answers to their queries. A global positioning system in a car navigation system is a product that can satisfy the mobile users' requirements, such as locating their current position, finding the best way from *A* to *B*, finding interest points within a certain range , finding k nearest neighbors(KNNs), and so on. In mobile navigation, the continuous monitoring of interest points or interest objects while the mobile user is on the move is an important criteria of mobile navigation. Normally, in continuous monitoring, when interest points or interest objects are changed due to the movement of mobile users, the mobile users are notified of these changes. These are known as spilt nodes. Therefore, existing works have been much focused on processing split nodes efficiently.

2.2.VISIBLE REVERSE k NEAREST NEIGHBOR QUERY PROCESSING IN SPATIAL DATABASES

Reverse nearest neighbor (RNN) queries have a broad application base such as decision support, profile-based marketing, resource allocation, etc. RNN search does not take obstacles into consideration. In the real world, however, there are many physical obstacles (e.g., buildings) and their presence may affect the visibility between objects. Introduce a novel variant of RNN queries, namely, visible reverse nearest neighbor (VRNN) search, which considers the impact of obstacles on the visibility of objects. Given a data set P, an obstacle set O, and a query point q in a 2D space, a VRNN query retrieves the points in P that have q as their visible nearest neighbor. An efficient algorithm for VRNN query processing, assuming that P and O are indexed by R-trees.

The techniques do not require any preprocessing and employ half-plane property and visibility check to prune the search space. The solution to several variations of VRNN queries, including: 1) visible reverse k-nearest neighbor (VRkNN) search, which finds the points in P that have q as one of their k visible nearest neighbors; 2) -VRkNN search, which handles VRkNN retrieval with the maximum visible distance _ constraint; and 3) constrained VRkNN (CVRkNN) search, which tackles the VRkNN query with region constraint. Extensive experiments on both real and synthetic data sets have been conducted to demonstrate the efficiency and effectiveness of the algorithms under various experimental settings. Actually, the existence of physical obstacles has been considered in certain types of spatial queries.

They include:1) obstructed nearest neighbor (ONN) query , which returns the k>=1Þ points in P that have the smallest obstructed distances (defined as the length of the shortest path that connects any two points without crossing any obstacle from an obstacle set) to q; 2) visible k-nearest neighbor (VkNN) search, which finds the k nearest points that are visible to q; and 3) clustering spatial data in the presence of obstacles , which divides a set of 2D data points into smaller homogeneous groups (i.e., clusters) by taking into account the impact of obstacles.

2.3.CONTINUOUS RANGE SEARCH QUERY PROCESSING IN MOBILE NAVIGATION

Range search query processing has become one of the most important technologies in spatial and mobile databases. Most literature focuses on static range search extended from one point on both Euclidean distance and actual network distance, but there are only a few methods which can properly solve the problem for moving users, such as searching objects of interest on a road within a certain range. Although there are some techniques, which address continuous search, most approaches are absorbed in the KNN (k nearest neighbour) queries which are a different research area. Range search derived from R-tree in index and after that many advance approaches to solve the same problem more efficiently not only on Euclidean distance, but also on network distance.

The two new methods to process continuous range search query in mobile computing. The results of continuous range search query are retrieving all objects of interest within the range and the result should also indicate to user when the objects of interest will move in or out of range. One is constructed using R-tree index based on Euclidean distance, and the other addresses the requirement on actual network distance. Performs better only if density is low. Only works for low interest objects. Range search on Euclidean distance and network distance are quite different.

The former only needs to use Euclidean distance, but the latter calculates network distance, so more network detail will be involved in network distance range search. There is no exception for continuous range search methods. The basic method for spatial database indexing is derived from the construction of R-Tree, which has been proven very efficient and simple for current spatial database systems. Due to its popularity, The method of continuous range search on Euclidean distance is also an extension from it.

2.4.RANKED REVERSE NEAREST NEIGHBOR SEARCH

The main goal of RkNN query is to determine the influence set i.e.,a subset of data points in P considered to be influenced by a given query point q if q is the immediate NN to them. RNN query is called monochromatic RNN since the answer data points and their NNs are all from the same set of points. On the other hand, bichromatic RNN searches answer data points from one set of points, P, with their NNs taken from another set of data points say Q.

Given a set of data points P and a query point q in a multidimensional space, Reverse Nearest Neighbor (RNN) query finds data points in P whose nearest neighbors (NNs) are q. Reverse k-NN (RkNN) query (where $k \geq 1$) generalizes RNN query to find data points whose kNNs include q. RkNN query semantics, q is said to have an influence on all those answer data points. The degree of q's influence on a data point p(εP) is denoted by k_p, where q is the k_pth NN of p.

A new variant of RNN query, namely, Ranked RNN (RRNN) query, that retrieves t data points most influenced by q, i.e., the t data points having the smallest ks with respect to q. To answer this RRNN query efficiently, use the two novel algorithms, k-Counting and k-Browsing that are applicable to both monochromatic and bichromatic scenarios and are able to deliver results progressively. Through an extensive performance evaluation, validate that the two proposed RRNN algorithms are superior to solutions derived from algorithms designed for RkNN query. Only for low-dimensional datasets. Low performance on high dataset dimension.

2.5.CONTINUOUS NEAREST NEIGHBOR QUERIES OVER SLIDING WINDOWS

Continuous monitoring of nearest neighbor (NN) queries over sliding window streams. According to this model, data points continuously stream in the system, and they are considered valid only while they belong to a sliding window that contains 1) the W most recent arrivals (count-based) or 2) the arrivals within a fixed interval W covering the most recent time stamps (time-based).

The task of the query processor is to constantly maintain the result of long-running NN queries among the valid data. The two processing techniques that apply to both count-based and time-based windows. The first one adapts conceptual partitioning, the best existing method for continuous NN monitoring over update streams, to the sliding window model. The second technique reduces the problem to skyline maintenance in the distance-time space and precomputes the future changes in the NN set.

Analyze the performance of both algorithms and extend them to variations of NN search. Finally, compare their efficiency through a comprehensive experimental evaluation. The skyline-based algorithm achieves lower CPU cost, at the expense of slightly larger space overhead. Cost models only for uniform data. Low accurate estimation for query processing. This Methods apply only for regular grids. It have a Poor Distance functions.

III.CONCLUSION

From this paper we perform literature survey on path and distance based query processing in mobile systems

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