A NEW SPATIAL OBJECT SEARCH FRAMEWORK FOR ROAD NETWORKS

R. BALAMURALI*[1], MR.V.UDHAYAKUMAR*[2]

[1]M.Tech Student Department of Computer Science and Engineering,

[2]Assistant professor Department of Computer Science and Engineering,

PRIST University Pondicherry, India

ABSTRACT

In this paper, we present a new system framework called ROAD for spatial object search on road networks. ROAD is extensible to diverse object types and efficient for processing various location-dependent spatial queries (LDSQs), as it maintains objects separately from a given network and adopts an effective search space pruning technique. Based on our analysis on the two essential operations for LDSQ processing, namely, network traversal and object lookup, ROAD organizes a large road network as a hierarchy of interconnected regional subnetworks (called Rnets). Each Rnet is augmented with
1) shortcuts and 2) object abstracts to accelerate network traversals and provide quick object lookups, respectively. To manage those shortcuts and object abstracts, two cooperating indices, namely, Route Overlay and Association Directory are devised. In detail, we present
1) the Rnet hierarchy and several properties useful in constructing and maintaining the Rnet hierarchy, 2) the design and implementation of the ROAD framework, and 3) a suite of efficient search algorithms for single-source LDSQs and multisource LDSQs. The analysis and experiment results show the superiority of ROAD over the state-of-the-art approaches.

Keywords:

Multi Source-Dependent Spatial Queries (MSDSQs), Location-Dependent Spatial Queries (LDSQs)

1. INTRODUCTION

WHILE location-based services (LBSs) are booming in this decade, many vendors start to provide map and navigation services (e.g., GoogleMap, Yahoo! Map) along with convenient geo-tagging tools that enable the content providers . Here, we refer to location-dependent information .We define queries that search for spatial objects with respect to user-specified locations as location-dependent spatial queries (LDSQs).

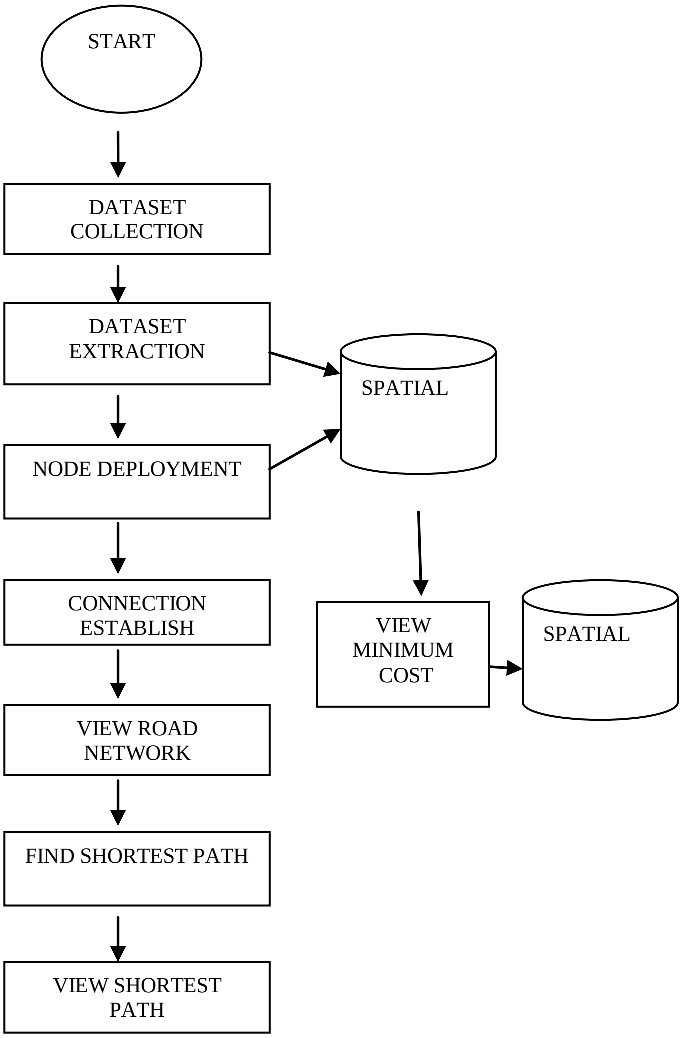
In processing LDSQs on a road network, two basic operations, namely, network traversal and object lookup, are involved. The former visits network nodes and edges according to network proximity, while the latter accesses and checks the attributes of objects located at traversed nodes or edges against object search criteria. Objects collected during the course of a traversal form a query result. Logically, the more network traversals and object lookups are involved, the larger the query processing overhead is incurred.. As network traversals and object placements are constrained by the network topology, nodes and edges (i.e., the entire network) conceptually form an object search space. we could facilitate network traversals by pruning those subspaces without objects of interest. This observation inspires an idea of search space pruning, based on which we design a novel, efficient, and extensible system framework, called ROAD, for processing LDSQs on road networks. In ROAD, a network is

first formulated as a set of interconnected regional subnets called Rnets, each representing a search subspace. On top of the Rnets, two kinds of additional information are derived:
1) selective (shortest) paths across an Rnet that enable any traversal to bypass the Rnet if it has no object of interest, and
2) the existence and/ or contents of objects that are inside the Rnets to provide quick traversal guidelines. Both 1) and 2) are further elaborated into the notions of shortcuts and object abstract, respectively.

2. RELATED WORK

Existing works on processing LDSQs on road networks are categorized as solution-based approaches and extended spatial database approaches, extended spatial database approaches incorporate road networks to existing spatial databases. Two basic search strategies were studied. The first strategy is based on the idea of euclidean distance bound. New roads are constructed or existing roads are closed, the corresponding network topology is changed. We model these changes as addition or deletion of nodes and edges. Here, we treat changes of nodes as special cases of changes of edges, and only consider addition and deletion of edges below. Deleting an edge breaks the link between two nodes n and n0. Consider deleting in R2 in. Its deletion can be managed as handling the change of its edge distance to infinity and updating affected shortcuts. It is possible that one end node n of a deleted edge is a border node

3. SYSTEM ARCHITECTURE



4. PROPOSED SYSTEM

We propose two novel index structures, namely, Route Overlay and Association Directory (and ROAD is named after these two key components). The Distance browsing has been recently proposed based on the concept of path coherence that for any node n, all other nodes with their shortest paths from n via one of n's immediate neighboring nodes are spatially close. Based on this idea, shortest path quad-tree (SPQT). A new system framework for LDSQ processing, in this paper. The design of ROAD achieves a clear separation between objects and network for better system extensibility. It also exploits search space pruning, a powerful technique for efficient object search. Upon the framework, efficient search algorithms for single source and multisource LDSQs are devised. Via a comprehensive performance evaluation on real road networks, ROAD is shown to significantly outperform the state-of-the art techniques.

5. ADVANTAGES OF PROPOSED SYSTEM

We present ROAD, a novel system framework to support spatial object searches on road networks. ROAD cleanly separates the road network and objects, exploits the idea of search space pruning, and supports searches with different distance metrics. We formulate Rnet hierarchy and explore several properties to reduce indexing overhead and improve query and update performance. We devise efficient search algorithms for single source range queries and (k)NN queries, i.e., classical types of LDSQs, upon the ROAD framework. We devise efficient search algorithms for multisource range queries and (k)NN queries to illustrate the extensibility of ROAD for different LDSQs. We develop efficient update techniques for ROAD maintenance to handle object and network updates.

6. IMPLEMENTATION

6.1 Spatial Road Network

We refer to location-dependent information (e.g., point of interest, traffic, and local events) as spatial objects (or objects for short). We define queries that search for spatial objects with respect to user-specified locations as location-dependent spatial queries (LDSQs). A novel system framework to support spatial object searches on road networks. ROAD cleanly separates the road network and objects, exploits the idea of search space pruning, and supports searches with different distance metrics. The goal of ROAD is to provide a general-purpose search platform for any added-on spatial objects and various LDSQs, we adopt a network partitioning that can generate equal-sized Rnets and the smallest number of border nodes, which, in turn, minimizes the number of shortcuts formed. This network partitioning problem is, however, known NP-complete.

6.2 Shortest Path

A network is first formulated as a set of interconnected regional subnets called Rnets, each representing a search subspace. On top of the Rnets, two kinds of additional information are derived: selective (shortest) paths across an Rnet that enable any traversal to bypass the Rnet if it has no object of interest, and the existence and or contents of objects that are inside the Rnets to provide quick traversal guidelines. First identify candidate objects that have euclidean distances to the query point bounded by a distance threshold. Then, they determine network distances between individual candidate object and the query point based on shortest path algorithms or materialized distances and finally, they discard false candidates whose network distances actually are larger than the threshold.

6.3 Query Performance

We detail the design, implementation, and evaluation of ROAD, and provide a holistic solution to several important research issues that include organization of Rnets, search algorithms for various LDSQs, and framework updates. We also perform an analysis and simulation to evaluate the ROAD performance. we provide a theoretical analysis on the performance of ROAD, in terms of 1) storage cost, 2) construction time, and 3) query processing cost. the cost for maintaining an Association Directory is much smaller than that for Route Overlay, we focus our analysis only on the latter.

6.4 Edge Distance

Road condition and road network structure change over time. Rather than immediately rebuilding a Route Overlay upon changes, which is expensive, we develop several techniques to incrementally update Route Overlay for edge distance changes, and network structure changes.

7. CONCLUSIONS

The on-going trend of web-based LBSs demands a system framework that can be extended to accommodate diverse objects, provide efficient processing of various LDSQs, and support different distance metrics. In response to these needs, we propose ROAD, a new system framework for LDSQ processing, in this paper. The design of ROAD achieves a clear separation between objects and network for better system extensibility. It also exploits search space pruning, a powerful technique for efficient object search. Upon the framework, efficient search algorithms for singlesource and multisource LDSQs are devised. Via a comprehensive performance evaluation on real road networks, ROAD is shown to significantly outperform the state-of-theart techniques. Recently, various LDSQs, such as continuous queries [4], skyline queries [23] and optimal location queries [24], were researched. However, existing works addressed them based on the solution-based approaches or extended spatial database approaches and thus suffered from the shortcomings of those approaches. In the future, we are going to extend our ROAD framework to support those emerged LDSQs.

8..REFERENCES

[1] Garmin, “POI Loader,” http://www8.garmin.com/products/ poiloader, 2010.

[2] Google, “Map Maker,” http://www.google.com/mapmaker, 2010.

[3] M.R. Kolahdouzan and C. Shahabi, “Voronoi-Based K Nearest Neighbor Search for Spatial Network Databases,” Proc. 30th Int’l Conf. Very Large Data Bases (VLDB), pp. 840-851, 2004.

[4] H.-J. Cho and C.-W. Chung, “An Efficient and Scalable Approach to CNN Queries in a Road Network,” Proc. Int’l Conf. Very Large Data Bases (VLDB), pp. 865-876, 2005.

[5] H. Hu, D.L. Lee, and J. Xu, “Fast Nearest Neighbor Search on Road Networks,” Proc. 10th Int’l Conf. Extending Database Technology (EDBT), pp. 186-203, 2006.

Student Information

Student of Prist University and Currently pursuing MTECH.,CSE, in Prist University, Puducherry Campus and publishing this Paper under the guidance of Mr.V.UDHAYA KUMAR M.TECH.,

Authors Profile

Mr.V.UDHAYA KUMAR M.TECH., currently employed as Asst Professor in the Department of CSE., at Prist University. Pudhucherry Campus**.**