

**Range-based Nearest Neighbor Queries with Complex-shaped Obstacles**

**Abstract:**

In this paper, we study a novel variant of obstructed nearest neighbor queries, namely, range-based obstructed nearest neighbor (RONN) search. As a natural generalization of continuous obstructed nearest-neighbor (CONN), an RONN query retrieves a set of obstructed nearest neighbors corresponding to every point in a specified range. We propose a new index, namely binary obstructed tree (called OB-tree), for indexing complex objects in the obstructed space. The novelty of OB-tree lies in the idea of dividing the obstructed space into non-obstructed subspaces, aiming to efficiently retrieve highly qualified candidates for RONN processing. We develop an algorithm for construction of the OB-tree and propose a space division scheme, called optimal obstacle balance (OOB2) scheme, to address the tree balance problem. Accordingly, we propose an efficient algorithm, called RONN by OB-tree Acceleration (RONN-OBA), which exploits the OB-tree and a binary traversal order of data objects to accelerate query processing of RONN. In addition, we extend our work in several aspects regarding the shape of obstacles, and range-based k NN queries in obstructed space. At last, we conduct a comprehensive performance evaluation using both real and synthetic datasets to validate our ideas and the proposed algorithms. The experimental result shows that the RONN-OBA algorithm outperforms the two R-tree based algorithms and RONN-OA significantly.

**Existing System:**

Mobile users do not want to reveal their exact location information to location-based service providers, due to the concern of location privacy leaking. Spatial cloaking, a well-received privacy preserving technique, proposes to blur the user’s exact location into a spatial region in order to satisfy the user’s specified privacy requirements.

For services that facilitate continuous lookup of nearest neighbors while a user is moving around an area, it is inefficient to constantly process individual NN queries against the whole data set at the server.

Considering the problem of RNN under the context of obstructed space, in this paper, we propose a new spatial query, namely, range-based obstructed nearest neighbor (RONN) query. Given a set of data objects P, and a set of obstacles O, an RONN query, specified by a query range R, retrieves all the nearest neighbors corresponding to every point in R based on obstructed distance.

**Proposed System:**

We proposed a novel tree index, namely, O-tree, by dividing the obstructed space into four non-obstructed subspaces in our SIGMOD 2016, where two R-tree based algorithms ( CONNB and RONN-RF) and one O-tree based algorithm (RONN-OA) are designed to process RONN. This new index prevails R-tree in supporting efficient RONN query processing. However, this space division scheme results in many small subspaces and many leaf nodes in Otree, incurring significant redundancy (i.e., overlap of data objects among leaf nodes). Moreover, this space division consumes a lot of time to decide how to divide the space, by examining numerous alternatives to choose the best division. In this paper, we propose a new index, namely, binary obstructed tree (called OB-tree), which organizes data objects and obstacles in a way that non-obstructed subspaces are efficiently produced to alleviate the computation of obstructed distance. The novelty of OB-tree lies in the idea of effectively dividing the obstructed space into two non-obstacle subspaces, aiming to efficiently retrieve highly qualified candidates for accelerating RONN processing. Obtree is constructed by sequentially selecting obstacles to find optimal obstacles for space division recursively. Eventually, R-trees are embedded in the OB-tree to handle the nonobstructed subspaces.