Trajectories Searching Using Region of Interest

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Abstract- *With the increasing availability of moving-object tracking data, trajectory search is increasingly important. We investigate and propose a novel query type named trajectory search by regions of interest (TSR query). Given an argument set of trajectories, a TSR query takes a set of regions of interest as a parameter and returns the trajectory in the argument set with the highest spatial-density correlation to the query regions. This type of query is useful in many popular applications such as trip planning and recommendation, and location based services in general. TSR query processing faces three challenges: how to model the spatial-density correlation between query regions and data trajectories, how to effectively prune the search space, and how to effectively schedule multiple so-called query sources. To tackle these challenges, a series of new metrics are defined to model spatial-density correlations. An efficient trajectory search algorithm is developed that exploits upper and lower bounds to prune the search space and that adopts a query-source selection strategy, as well as integrates a heuristic search strategy based on priority ranking to schedule multiple query sources. The performance of TSR query processing is studied in extensive experiments based on real and synthetic spatial data.*

Keywords- Trajectory, Correlation, Planning, Spatial databases, Electronic mail, Query processing, Measurement.

I. INTRODUCTION

The availability of GPS-equipped devices (e.g., vehicle navigation systems and smart phones) and online map-based services enable people to capture their current location and to share their trajectories by means of services Also, more and more social networking sites support the sharing of trajectories. The availability of massive trajectory data enables novel mobile applications. Such applications may utilize trajectory search, which finds trajectories that are similar in some specific sense to query parameters (a set or sequence of locations [1], [2], [3], [4], [5], or regions). This type of query can benefit popular services, such as travel planning and recommendation, and location-based services in general. For example, when planning a trip to multiple places in an unfamiliar city, a tourist may benefit from the experience of previous visitors. In particular, visitors with similar interests may have visited nearby landmarks that the user may not know, but may be interested in. Or others may have avoided a specific road because it is unpleasant, although it may seem like a good choice in terms of distance. Such experiences are captured in trajectories shared by previous visitors. In existing studies all trajectories are treated the same, regardless of their frequencies of use. For example, some less traveled trajectories may be new or just less popular because the region they are in is less traveled. Such trajectories may still be of interest to be used.

II. EXISTING SYSTEM

- In most existing studies on trajectory search the query parameters are a set or sequence of locations. However, in some cases, a place may not be a point location, but may be a region of interest that contains several spatial objects (e.g., a scenic area, a commercial district, or a dining area, where spatial objects can be points of interest (POIs), geo-tagged photos, or geo-tagged tweets).[6]
- Moreover, especially when planning a trip in an unfamiliar city, users may fail to specify intended locations exactly and may use intended regions instead.
- Previous studies use spatial distance as the sole criterion when computing results.[7]

III. DISADVANTAGES OF EXISTING SYSTEM

- Spatial distance in itself fails to fully capture the relationship between a trajectory and a set of regions. For example, a user may not be satisfied with a travel route with a relatively sparse distribution of nearby objects, although the route is spatially close to the centers of the given query regions.
- Existing studies do not take query regions and spatial-object distribution into account, and their associated query processing techniques are either not applicable or not effective for the TSR query.

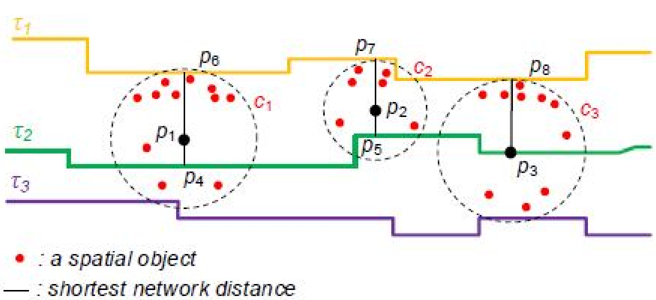
IV. PROPOSED SYSTEM

- We propose and investigate a novel query named trajectory search by regions (TSR). In our setting, a region is circular, and users can specify a region on a map simply by specifying a center and a radius. Given a trajectory set T, a user provides a set of regions of interest as query parameters, and the TSR query retrieves the trajectory from T with the highest spatial-density correlation with the query regions. Intuitively, a trajectory that is spatially close to regions with many spatial objects is more attractive to travelers than a further-away trajectory.
- To achieve better performance, a best-expansion search (BES) algorithm is proposed.[8]
- First, we reuse an existing query source selection strategy to select a set of query sources from among the centers of the query regions.
- Second, we define new upper and lower bounds on the spatial-density correlation to prune the search space.
- Third, a heuristic search strategy based on priority ranking is developed to coordinate the use of multiple query sources

V. ADVANTAGES OF PROPOSED SYSTEM

- To the best of our knowledge, this is the first study of region-based trajectory search in spatial networks that takes spatial-object density into account.
- It further prunes the search space for avoiding traversals of overlap regions
- The effective heuristic search strategy focuses on trajectories more likely to be the solution and further improves query performance.

VI. SYSTEM ARCHITECTURE



VII. TSR QUERY PROCESSING

The main drawback of the uniform-speed search (USS) is its lack of an effective scheduling strategy for multiple query sources, which may lead to poor performance. In addition, if the centers of two query regions are close to each other and both are selected as query sources, their search spaces may overlap substantially, which again decreases performance. Motivated by this, we develop a best-expansion search (BES) algorithm. First, we reuse an existing query-source selection strategy to select a set of query sources from the set of centers of query regions. Second, we define new upper and lower bounds on the spatial-density correlation to enable pruning. Third, we propose a heuristic search method to schedule expansion from the query sources effectively. We establish and maintain a dynamic priority ranking heap during query processing. At each step, we expand from the top-ranked query source until a new top-ranked query source appears (Section 5.3). The BES algorithm is detailed in Section 5.4. Compared to USS, the BES algorithm has two major advantages: (i) it further prunes the search space for avoiding the traversal of overlap areas; (ii) it is able to focus trajectories more likely to be the solution and to further improve the query performance.

Query-Source Selection Strategy We reuse the query-source selection strategy from PNC query processing . This strategy aims to reduce the search space during query processing. Linear programming is adopted to select query sources from query region centers. We assume trajectories and query regions are uniformly distributed.

VIII. PERFORMANCE OF THE SEQUENTIAL TSR QUERY

We conducted experiments to study the performance of processing the sequential TSR query. Compared to the original TSR query, the sequential TSR query needs more computational efforts to compute the upper and lower bounds, due to the more complex distance measures. In addition, a query source may not be matched with the closest vertex on a trajectory, which consequently requires a scan of more trajectory vertices to get the best match. Therefore, more query time and trajectory accesses are incurred.

IX. CONCLUSION

The system will make the users to select a list of interests apart from searching single. Also it helps user able to know the highest spatial region and make them to create a top most plan for their tour.

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