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Best Keyword Cover Search

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ABSTRACT:

It is common that the objects in a spatial database (e.g., restaurants/hotels) are associated with keyword(s) to indicate their businesses/services/features. An interesting problem known as Closest Keywords search is to query objects, called keyword cover, which together cover a set of query keywords and have the minimum inter-objects distance. In recent years, we observe the increasing availability and importance of keyword rating in object evaluation for the better decision making. This motivates us to investigate a generic version of Closest Keywords search called Best Keyword Cover which considers inter-objects distance as well as the keyword rating of objects. The baseline algorithm is inspired by the methods of Closest Keywords search which is based on exhaustively combining objects from different query keywords to generate candidate keyword covers. When the number of query keywords increases, the performance of the baseline algorithm drops dramatically as a result of massive candidate keyword covers generated. To attack this drawback, this work proposes a much more scalable algorithm called keyword nearest neighbor expansion (keyword-NNE). Compared to the baseline algorithm, keyword-NNE algorithm significantly reduces the number of candidate keyword covers generated. The in-depth analysis and extensive experiments on real data sets have justified the superiority of our keyword-NNE algorithm.

INTRODUCTION:

DRIVEN by mobile computing, location-based services and wide availability of extensive digital maps and satellite imagery (e.g., Google Maps and Microsoft Virtual Earth services), the spatial keywords search problem has attracted much attention recently. In a spatial database, each tuple represents a spatial object which is associated with keyword(s) to indicate the information such as its businesses/ services/ features. Given a set of query keywords, an essential task of spatial keywords search is to identify spatial object(s) which are associated with keywords relevant to a set of query keywords, and have desirable spatial relationships (e.g., close to each other and/or close to a query location). This problem has unique value in various applications because users' requirements are often expressed as multiple keywords. For example, a tourist who plans to visit a city may have particular shopping, dining and accommodation needs. It is desirable that all these needs can be satisfied without long distance traveling. Due to the remarkable value in practice, several variants of spatial keyword search problem have been studied.

This problem is known as m Closest Keywords (mCK) query. The problem studied in additionally requires the retrieved objects close to a query location. This paper investigates a generic version of mCK query, called Best Keyword Cover (BKC) query, which considers inter-objects distance as well as keyword rating. It is motivated by the observation of increasing availability and importance of keyword rating in decision making. Millions of businesses/services/features around the world have been rated by customers through online business review sites such as Yelp, Citysearch, ZAGAT and Dianping, etc. For example, a restaurant is rated 65 out of 100 (ZAGAT.com) and a hotel is rated 3.9 out of 5 (hotels.com). Due to the consideration of keyword rating, the solution of BKC query can be very different from that of mCK query.

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Fig. 1 shows an example. Suppose the query keywords are "Hotel", "Restaurant" and "Bar". mCK query returns ft2; s2; c2g since it considers the distance between the returned objects only. BKC query returns ft1; s1; c1g since the keyword ratings of object are considered in addition to the inter-objects distance. Compared to mCK query, BKC query supports more robust object evaluation and thus underpins the better decision making. This work develops two BKC query processing algorithms, baseline and keyword-NNE. The baseline algorithm is inspired by the mCK query processing methods. Both the baseline algorithm and keyword-NNE algorithm are supported by indexing the objects with an R*-tree like index, called KRR*-tree. In the baseline algorithm, the idea is to combine nodes in higher hierarchical levels of KRR*-trees to generate candidate keyword covers. Then, the most promising candidate is assessed in priority by combining their child nodes to generate new candidates. Even though BKC query can be effectively resolved, when the number of query keywords increases, the performance drops dramatically as a result of massive candidate keyword covers generated.

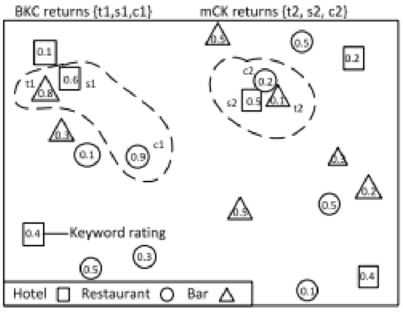

Fig. 1. BKC versus mCK.

To overcome this critical drawback, we developed much scalable keyword nearest neighbor expansion (keyword-NNE) algorithm which applies a different strategy. KeywordNNE selects one query keyword as principal query keyword. The objects associated with the principal query keyword are principal objects. For each principal object, the local best solution (known as local best keyword cover ðlbkcÞ) is computed. Among them, the lbkc with the highest evaluation is the solution of BKC query.

Given a principal object, its lbkc can be identified by simply retrieving a few nearby and highly rated objects in each non-principal query keyword (two-four objects in average as illustrated in experiments). Compared to the baseline algorithm, the number of candidate keyword covers generated in keyword-NNE algorithm is significantly reduced. The in-depth analysis reveals that the number of candidate keyword covers further processed in keyword-NNE algorithm is optimal, and each keyword candidate cover processing generates much less new candidate keyword covers than that in the baseline algorithm.

EXISTING SYSTEM

- Some existing works focus on retrieving individual objects by specifying a query consisting of a query location and a set of query keywords (or known as document in some context). Each retrieved object is associated with keywords relevant to the query keywords and is close to the query location.
- The approaches proposed by Cong et al. and Li et al. employ a hybrid index that augments nodes in non-leaf nodes of an R/R*-tree with inverted indexes.
- In virtual bR*-tree based method, an R*-tree is used to index locations of objects and an inverted index is used to label the leaf nodes in the R*-tree associated with each keyword. Since only leaf nodes have keyword information the mCK query is processed by browsing index bottom-up.

DISADVANTAGES OF EXISTING SYSTEM:

- When the number of query keywords increases, the performance drops dramatically as a result of massive candidate keyword covers generated.
- The inverted index at each node refers to a pseudo-document that represents the keywords under the node. Therefore, in order to verify if a node is relevant to a set of query keywords, the inverted index is accessed at each node to evaluate the matching between the query keywords and the pseudo-document associated with the node.

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PROPOSED SYSTEM:

- This paper investigates a generic version of mCK query, called Best Keyword Cover (BKC) query, which considers inter-objects distance as well as keyword rating. It is motivated by the observation of increasing availability and importance of keyword rating in decision making. Millions of businesses/services/features around the world have been rated by customers through online business review sites such as Yelp, Citysearch, ZAGAT and Dianping, etc.
- This work develops two BKC query processing algorithms, baseline and keyword-NNE. The baseline algorithm is inspired by the mCK query processing methods. Both the baseline algorithm and keyword-NNE algorithm are supported by indexing the objects with an R*-tree like index, called KRR*-tree.
- We developed much scalable keyword nearest neighbor expansion (keyword-NNE) algorithm which applies a different strategy. Keyword-NNE selects one query keyword as principal query keyword. The objects associated with the principal query keyword are principal objects. For each principal object, the local best solution (known as local best keyword cover lbkc) is computed. Among them, the lbkc with the highest evaluation is the solution of BKC query. Given a principal object, its lbkc can be identified by simply retrieving a few nearby and highly rated objects in each non-principal query keyword (two-four objects in average as illustrated in experiments).

ADVANTAGES OF PROPOSED SYSTEM:

- Compared to the baseline algorithm, the number of candidate keyword covers generated in keyword-NNE algorithm is significantly reduced. The in-depth analysis reveals that the number of candidate keyword covers further processed in keyword-NNE algorithm is optimal, and each keyword candidate cover processing generates much less new candidate keyword covers than that in the baseline algorithm.
- The proposed keyword-NNE algorithm applies a different processing strategy, i.e., searching local best solution for each object in a certain query keyword. As a consequence, the number of candidate keyword covers generated is significantly reduced.
- The analysis reveals that the number of candidate keyword covers which need to be further processed in keyword-NNE algorithm is optimal and processing each keyword candidate cover typically generates much less new candidate keyword covers in keyword-NNE algorithm than in the baseline algorithm.

IMPLEMENTATION MODULES:

- Indexing Keyword Ratings
- Keyword nearest Neighbor Expansion
- LBKC Computation
- Weighted Average of Keyword Ratings

MODULES DESCSRIPTION:

Indexing Keyword Ratings

A single tree structure is used to index objects of different keywords. The single tree can be extended with an additional dimension to index keyword rating. A single tree structure suits the situation that most keywords are query keywords. For the above mentioned example, all keywords, i.e., "hotel", "restaurant" and "bar", are query keywords. However, it is more frequent that only a small fraction of keywords are query keywords. For example in the experiments, only less than 5 percent keywords are query keywords. Therefore, multiple KRR*-trees are used in this work, each for one keyword.1 The KRR*-tree for keyword ki is denoted as KRR*ki-tree. Given an object, the rating of an associated keyword is typically the mean of ratings given by a number of customers for a period of time. The change does happen but slowly. Even though dramatic change occurs, the KRR*-tree is updated in the standard way of R*-tree update.

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Keyword nearest Neighbor Expansion

Using the baseline algorithm, BKC query can be effectively resolved. However, it is based on exhaustively combining objects (or their MBRs). Even though pruning techniques have been explored, it has been observed that the performance drops dramatically, when the number of query keywords increases, because of the fast increase of candidate keyword covers generated. This motivates us to develop a different algorithm called keyword nearest neighbor expansion. The goal of the interface is to provide point of interest information (static and dynamic ones) with, at least, a location, some mandatory's attributes and optional details (description,…). In order to provide that information, the component that implements the interface uses the map database information to locate and display point of interest (POI) or to select POI as route waypoint and favorite. This component not only provides search functionalities for the local database but also a way to connect external search engine to this component and enhance the search criteria and the list of results It also proposes a solution to get custom POIs (not part of the local map database) or to dynamically update content and description of local POI.

This is achieved by specifying and providing interfaces to:

- Select POIs from one of their attributes (e.g., Category, Name,…)
- Retrieve POI attributes (e.g., Location and Description)
- Get dynamic content for a given POI.
- Add custom POI to the map display
- Import new POIs and POIs categories from local file.

LBKC Computation

Given a spatial database, each object may be associated with one or multiple keywords. Without loss of generality, the object with multiple keywords are transformed to multiple objects located at the same location, each with a distinct single keyword.

When further processing a candidate keyword cover, keyword-NNE algorithm typically generates much less new candidate keyword covers compared to BF-baseline algorithm. Since the number of candidate keyword covers further processed in keyword-NNE algorithm is optimal the number of keyword covers generated in BF-baseline algorithm is much more than that in keyword- NNE algorithm. In turn, we conclude that the number of keyword covers generated in baseline algorithm is much more than that in keyword-NNE algorithm. This conclusion is independent of the principal query keyword since the analysis does not apply any constraint on the selection strategy of principal query keyword.

Weighted Average of Keyword Ratings

In keyword-NNE algorithm, the best-first browsing strategy is applied like BF-baseline but large memory requirement is avoided. For the better explanation, we can imagine all candidate keyword covers generated in BF-baseline algorithm are grouped into independent groups. Each group is associated with one principal node (or object).. When further processing a candidate keyword cover, keyword-NNE algorithm typically generates much less new candidate keyword covers compared to BF-baseline algorithm. Since the number of candidate keyword covers further processed in keyword-NNE algorithm is optimal, the number of keyword covers generated in BF-baseline algorithm is much more than that in keyword-NNE algorithm. This conclusion is independent of the principal query keyword since the analysis does not apply any constraint on the selection strategy of principal query keyword.

SCREENS

Fig 1: Home Page

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Fig 2: Admin Home Page

Fig 3: Upload Details

Fig 4: Upload Latitude and Longitude

Fig 5: User Search Keyword

Fig 6: View Places

CONCLUSION:

Compared to the most relevant mCK query, BKC query provides an additional dimension to support more sensible decision making. The introduced baseline algorithm is inspired by the methods for processing mCK query. The baseline algorithm generates a large number of candidate keyword covers which leads to dramatic performance drop when more query keywords are given. The proposed keyword-NNE algorithm applies a different processing strategy, i.e., searching local best solution for each object in a certain query keyword. As a consequence, the number of candidate keyword covers generated is significantly reduced.

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