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Optimal Route Search using Bounded Cost Informative Routes

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Abstract: As travel is taking more significant part in our life, route recommendation service becomes user interested to visit new spots and the new short rout as well as long route with the interesting new places, a big business and attracts many major players in IT industry. Given a user specified origin and destination, a route recommendation service aims to provide users the routes with the best travelling experience according to criteria such as travelling distance, travelling time, etc. However, previous research shows that even the routes recommended by the big-thumb service providers can deviate significantly from the routes travelled by experienced drivers. In this work the approach to this challenging problem is with a completely different perspective – leveraging crowds' knowledge to improve the recommendation quality. The widespread location-aware applications produce a vast amount of spatio-textual data that contains both spatial and textual attributes. To make use of this enriched information for users to describe their preferences for travel routes, a Bounded-Cost Informative Route (BCIR) query is proposed to retrieve the routes that are the most textually relevant to the user-specified query keywords subject to a travel cost constraint. BCIR query is particularly helpful for tourists and city explorers to plan their travel routes. The proposed system will show that BCIR query is an NP-hard problem. To answer BCIR query efficiently, the exact solution is explained with effective pruning techniques and two approximate solutions with performance guarantees. Extensive experiments over real data sets demonstrate that the proposed solutions achieve the expected performance.

Keywords: Route query, Query keyword, Bounded cost, Informative rotes.

I. INTRODUCTION

Optimal Route Search using Bounded-Cost Informative Routes splays a vital role in our daily life. Thanks to the rapid development of GPS technologies and flourish of navigation service providers (e.g., Google Map, Bing Map, Tom-tom), we can now travel to unfamiliar places with much less effort, by simply following the recommended routes. While the detailed mechanisms that are adopted to recommend routes are different, travelling distance and time are the most important criteria and factors in those recommendation algorithms, which results in the shortest route and/or fastest route. With increasing number of users who rely on these map services to travel, a natural question arises: are these routes always good enough to be the best choice when people travel? Ceikute et al are the first to assess the routing service quality by comparing the popular routes, the ones most drivers prefer, and the routes recommended by a big thumb map service provider. Their results show that is big distances between popular routes and recommended routes. It concludes that experienced/frequent drivers' preferences do not always agree with the routes recommended by navigation service. Actually the cause of this phenomenon is not difficult to find out: drivers preferences are influenced by lots of factors in addition to distance and time, such as the number of traffic lights, speed limitation, road condition, weather, amongst many others, which are very difficult to be taken into consideration simultaneously by a single routing algorithm. That is to say, driver's preference is the ultimate criterion to judge the goodness of a route, i.e., given a source and a destination, route A is regarded as a better choice than route B if more drivers prefer to drive along A for some reasons. . In other words, spatial objects involve spatial data along with longitude and latitude of location. Querying such data is called best keyword cover querying. Search is called best keyword cover search. Existing method to such data consider either minimum inter objective distance and keyword search. As a result new methods for best keyword cover search compute nearest neighbour search focus on finding nearest neighbours where keywords and spatial data plays a major impact.

II. PROBLEM STATEMENTS

A. Problem Statement

When we are planning any trip, we limit to certain conditions such as location, time, budget, etc. In the proposed system, an efficient keyword aware representative travel route framework is explained that uses knowledge extraction from users historical mobility records and social interactions

B. Goals and Objectives

The goals and objectives are as follows:

1) Accurately find out the different places.
2) To reduce the time required for finding rout related information.
3) By using maximum number of resources and in minimum cost tourists can visit the interesting places according to their preferences.
4) The system provides not only optimal route but also interesting and pleasant route.

III. LITERATURE SURVEY

For finding the optimized routes, early research focused on finding most efficient routes. For example, Xin Cao et al. [1] used keyword-aware optimal route query also known as KOR, which is used to find the optimal routes that satisfies the specified budget constraints and also it covers set of user specified keywords. The approximation algorithms like OSScaling, BucketBound and greedy algorithm are used. Daniele Quercia et al. [2] suggests the optimized paths which are not only shortest but also pleasant and happy by using data provided by online services like Flickr or Four-square. Yifeng Zeng et al. [3] introduced the keyword coverage function and define the optimal route search for keyword coverage (ORS-KC) problem, which is used to find optimal route such that it can optimally satisfy the users preferences. For solving ORS-KC they used variants of A* algorithm which is based on heuristic function. Yu Zheng et al. [4] used the GPS trajectories generated by multiple users so that a person can able to find some places that attract them from other people' travel routes, hence, plan an interesting and efficient journey based on multiple users experience. Mao Ye et al. [5] aimed to provide a point-of-interest (POI) recommendation service for the rapid growing location-based social networks (LBSNs), e.g., Four-square, Flickr, etc. Muhammad Aamir Saleem et al. [6] studied how the users of LBSN navigate between locations and based on that information they select the most influential location. For this purpose they described two models namely absolute influential model and relative influential model and also proposed an Oracle data which can be used to find the top-k influential locations. Kunjie Chen et al. [7] used Aggregate-keyword routing query, which focuses on multiple query points in a spatial keyword search. They also designed approximation algorithm called as Centre Based Assignment which tries to find aggregate points and task points near the centre of the query point and then uses the greed approach to assign those task points.

IV. PROPOSED SYSTEM

In proposed system Given a user specified origin and destination, a route recommendation service aims to provide users the routes with the best travelling experience according to criteria such as travelling distance, travelling time, etc. However, previous research shows that even the routes recommended by the big-thumb service providers can deviate significantly from the routes travelled by experienced drivers.The proposed system consists of an efficient Keyword-aware Representative Travel Route framework that uses knowledge extraction from users' historical mobility records and social interactions and also, Crowd Planner – a novel crowd-based route recommendation system has been developed, which requests human workers to evaluate candidates routes recommended by different sources and methods, and determine the best route based on the feedbacks of these workers. Finally we apply Sentiment Analysis for to display positive reviews only regarding that place.

V. ALGORITHMS

In the proposed system K-Nearest Neighbors (KNN) algorithm is used for finding the nearest interesting places in between our route in section 1, and also the comment analyzer that is sentimental analysis in section 2, which is used for analyzing the users positive reviews.

A. KNN (K-Nearest Neighbours)

1) Determine parameter k = number of nearest neighbour.
2) Calculate the distance between the query instance and all the training samples.
3) Sort the distance and determine nearest neighbour based on th k th minimum distance.
4) Gather the category y of the nearest neighbour.

a) *K-nearest neighbour (Knn) algorithm pseudo code*

Let (X_i, C_i) where i = 1, 2……., n be data points. X_i denotes feature values & C_i denotes labels

For X_i for each i.

Assuming the number of classes as 'c'

$C_i \in \{1, 2, 3, ……, c\}$ for all values of i

Let x be a point for which label is not known, and we would like to find the label class using k-nearest neighbor algorithms.

b)   KNN Algorithm Pseudo code

i)   Calculate "$d(x, x_i)$" i =1, 2, ……, n; where d denotes the Euclidean distance between the points.

ii)   Arrange the calculated n Euclidean distances in non-decreasing order.

iii)   Let k be a +ve integer, take the first k distances from this sorted list.

iv)   Find those k-points corresponding to these k-distances.

v)   Let k_i denotes the number of points belonging to the ith class among k points i.e. $k \geq 0$

vi)   If $k_i > k_j \; \forall \; i \neq j$ then put x in class i.

B. Sentimental Analysis

1)   Get Terms - Reduce each review to the list of words

2)   Filtering - Remove unnecessary words that will not add value for sentiment analysis - is, among, but, and, it, that

3)   Base Word - Convert all inflections to their root word

a)   fry, fries, fried -> fry

b)   going, go , went, goes -> go

c)   movies, movie -> movie

4)   Make Features - Use the words thus extracted from a review as features to indicate the positiveness or negativeness of   that review

5)   Classifier - Train a classifier to predict positivity

a)   Comment Analyser

i)   *Input:* Preprocessed comment

ii)   *Output:* Comment categorized as positive negative or neutral.

iii)   *Overall Pol:* Polarity of the whole comment.

iv)   *Sent Pol:* Polarity of the sentence within the comment.

v)   *POS:* Part of Speech of the word.

BEGIN

1.   overallPol = 0

2.   For each sentence in comment

3.   F

4.   sentPol = 0

5.   For each word in sentence

6.   F

7.   If Polarity[word] == Positiv

8.   F

9.   If POS[word] == Adjective

10.   sentPol = sentPol + 4

11.   Else if POS[word] == Adverb

12.   sentPol = sentPol + 3

13.   . Else if POS[word] == Verb

14.   sentPol = sentPol + 2

15.   Else:

16.   sentPol = sentPol + 1

17.   g

18.   Else if Polarity[word] == Negative

19.   . f

20.   If POS[word] == Adjective

21.   sentPol = sentPol 4

22.   Else if POS[word] == Adverb

23.   sentPol = sentPol 3

24.   Else if POS[word] == Verb

25.   sentPol = sentPol 2

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26. *Else*
27. sentPol = sentPol 1
28. g
29. Else if word is a Negation word
30. sentPol = - sentPol
31. g
32. overallPol = overallPol + sentPol
33. g
34. If overallPol > 0
35. Return Positive Comment
36. Else if overallPol < 0
37. Return Negative Comment
38. Else
39. Return Neutral Comment

VI. SYSTEM ARCHITECTURE
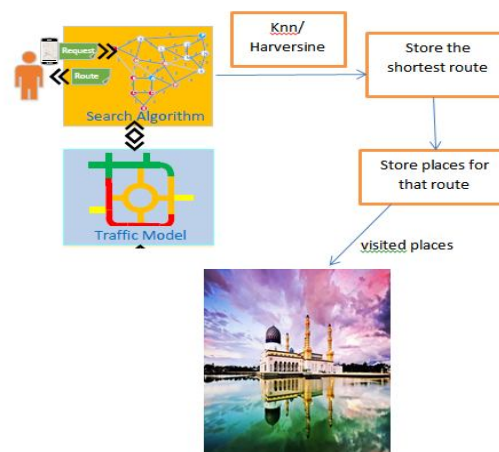
Fig. 1 System Architecture

VII. CONCLUSIONS

In this paper, the BCIR query to retrieve the route that is most textually relevant to the user-specified query keywords within a travel cost budget. To efficiently process BCIR queries, the different algorithms and techniques are used. In this way by using the KNN algorithm the nearest attractions based on users place of interest (POI) are determined on user defined source and destination. Also the system determines the best routes based on the feedbacks of the previous users and the optimal route is suggested to the new user. The proposed solutions achieve satisfying performance over different data sets. BCIR provides a new type of route query that can be applied in various applications ranging from route planning to location-aware recommendation.

VIII. ACKNOWLEDGMENT

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