

## Efficient Clue-based Route Search on Road Networks

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### ABSTRACT

With the advances in geo-positioning technologies and location-based services, it is nowadays quite common for road networks to have textual contents on the vertices. Previous work on identifying an optimal route that covers a sequence of query keywords has been studied in recent years. However, in many practical scenarios, an optimal route might not always be desirable. For example, a personalized route query is issued by providing some clues that describe the spatial context between PoIs along the route, where the result can be far from the optimal one. Therefore, in this paper, we investigate the problem of clue-based route search (CRS), which allows a user to provide clues on keywords and spatial relationships. First, we propose a greedy algorithm and a dynamic programming algorithm as baselines. To improve efficiency, we develop a branch-and-bound algorithm that prunes unnecessary vertices in query processing. In order to quickly locate candidate, we propose an AB-tree that stores both the distance and keyword information in tree structure. To further reduce the index size, we construct a PB-tree by utilizing the virtue of 2-hop label index to pinpoint the candidate. Extensive experiments are conducted and verify the superiority of our algorithms and index structures.

### INTRODUCTION

With the rapid development of location-based services and geopositioning technologies, there is a clear trend that an increasing amount of geo-textual objects are available in many applications. For example, the location information as well as concise textual descriptions of some businesses (e.g., restaurants, hotels) can be easily found in online local search services (e.g., yellow pages). To provide better user experience, various keyword related spatial query models and techniques have emerged such that the geotextual objects can be efficiently retrieved. It is common to search a Point-of-Interest (PoI) by providing exact address or distinguishable keyword (i.e., only few PoIs contain the keyword) in a region which can uniquely pinpoint the location. For example, we type the address “73 Mary St, Brisbane” or the name “Kadoya” on Google Maps to find a Japanese restaurant in the CBD area. Different with their work, we aim to find a feasible route on road networks by using clues. Particularly, in this paper, we investigate a novel query type, namely clue-based route search (CRS), which allows a user to provide clues on textual and spatial context along the route such that a best matching route w.r.t. the clues is returned. More specifically, a CRS query is defined over a road network  $G$ , and the input of the query consists of a source vertex  $v_q$  and a sequence of clues, where each clue contains a query keyword and a user

expected network distance. A vertex contains a clue keyword is considered as a match vertex. The query returns a path  $P$  in  $G$  starting at  $v_q$ , such that (i.)  $P$  passes through a sequence of match vertices (POIs) w.r.t. the clues and (ii.) the network distances between two contiguous matched vertices are close to the corresponding user specified distance such that the user's search intention is satisfied.

## LITERATURE SURVEY

### **Managing road route networks using userdefined keywords**

As our era is advancing towards the growth of geo-positioning technologies, people are in dire need of a personalized route query. In the recent years, work has been done towards an optimal route covering a sequence of keywords. Although, an optimal route might not always be the road one wants to go through. A personalized query can be defined by some clues that describe the spatial context between Points of Interest along the route which can immensely differ in comparison to the optimally defined route. Therefore, we have broken down the clue based research algorithm which enables the user to mention their own keywords and establishes their inter structural association. First, we propose a greedy algorithm and then we move on to a dynamic programming algorithm. These algorithms form the headlines of the aforesaid idea.

### **SpeakNav: Voice-based Route Description Language Understanding for Template-driven Path Search**

Many navigation applications take natural language speech as input, which avoids users typing in words and thus improves traffic safety. However, navigation applications often fail to understand a user's free-form description of a route. In addition, they only support input of a specific source or destination, which does not enable users to specify additional route requirements. We propose a SpeakNav framework that enables users to describe intended routes via speech and then recommends appropriate routes. Specifically, we propose a novel Route Template based Bidirectional Encoder Representation from Transformers (RT-BERT) model that supports the understanding of natural language route descriptions. The model enables extraction of information of intended POI keywords and related distances. Then we formalize a template-driven path query that uses the extracted information. To enable efficient query processing, we develop a hybrid label index for computing network distances between POIs, and we propose a branch-and-bound algorithm along with a pivot reverse B-tree (PB-tree) index. Experiments with real and synthetic data indicate that RT-BERT offers high accuracy and that the proposed algorithm is capable of outperforming baseline algorithms.

### **Research on Coherent Clue Based Route Search for Travel Route Search**

Further in geo-situating innovations with Location-based services (LBS), it is today basic designed for street systems near enclose a literary substance through vertices. Past work on

trademark and best way to facilitate cover an arrangement of query keywords erstwhile examined as of late. Be that as it may, in a few reasonable outcomes, the best route may not persistently be entrancing. For instance, a tweaked route question is issued by giving a few insights that portray the spatial setting between Points on the route, any place the outcome is far away from the best one. Accordingly, during this paper, we tend to explore the some clue-based route search (CRS) that permit a client toward supply clues on keywords with special connections. Initial, we tends to proposition a greedy algorithm program, in addition to the adaptive programming algorithmic program. o enhance potency , we tend to build up a branch-and-bound algorithmic program that prunes of the additional vertices question process. To rapidly discover an applicant, we tend to propose AB-tree so as to stores, each separation with keywords data tree structure. Toward any downsize file measure; we tend to develop a PB-tree by using the prudence of a 2-jump mark list to pinpoint the hopeful. Top to bottom, tests are directed and confirm the commonness of our calculations and list structures.

### **Indoor Top-k Keyword-aware Routing Query**

People have many activities indoors and there is an increasing demand of keyword-aware route planning for indoor venues. In this paper, we study the indoor top-k keyword-aware routing query (IKRQ). Given two indoor points  $s$  and  $t$ , an IKRQ returns  $k$   $s$ -to- $t$  routes that do not exceed a given distance constraint but have optimal ranking scores integrating keyword relevance and spatial distance. It is challenging to efficiently compute the ranking scores and find the best yet diverse routes in a large indoor space with complex topology. We propose prime routes to diversify top-k routes, devise mapping structures to organize indoor keywords and compute route keyword relevances, and derive pruning rules to reduce search space in routing. With these techniques, we design two search algorithms with different routing expansions. Experiments on synthetic and real data demonstrate the efficiency of our proposals.

### **System Study:**

- Li et al. [13] studies the problem of direction aware spatial keyword search, which aims at finding the  $k$  nearest neighbors to the query that contain all input keywords and satisfy the direction constraint. Rocha et al. [20] address the problem of processing top-k spatial keyword queries on road networks where the distance between the query location and the spatial object is the length of shortest path. ROAD [11] organizes the road network as a hierarchy of sub graphs, and connects them by adding shortcuts. For each sub graph, an object abstract is generated for keyword checking. By using network expansion, the sub graphs without intended object are pruned out.
- G-tree [16] adopts a graph partitioning approach to form a hierarchy. Within each sub graph, a distance matrix is kept, and for any two sub graphs, the distances between all borders of them are stored as well. Based on these distances, it efficiently computes the distance between query vertex and target vertices or tree nodes. Jiang et al. [17] adopt 2-hop label for

handling the distance query for kNN problem on large networks, and facilitates KT index to handle the performance issue of frequent keywords.

- Liu et al. [15] formalize the spatio-textual context information of the querying POI as clues and use them to identify the most promising POIs, which is closely related to our CRS problem. Different with their work, we aim to find a feasible route on road networks by using clues. In addition, the spatial distance considered in our work is network distance so that the algorithms in [19] cannot be applied.

### **Disadvantages**

- There is no Clue-based Route Navigation to find exact Route path
- The searching is slow due to lack of Greedy Clue search algorithm

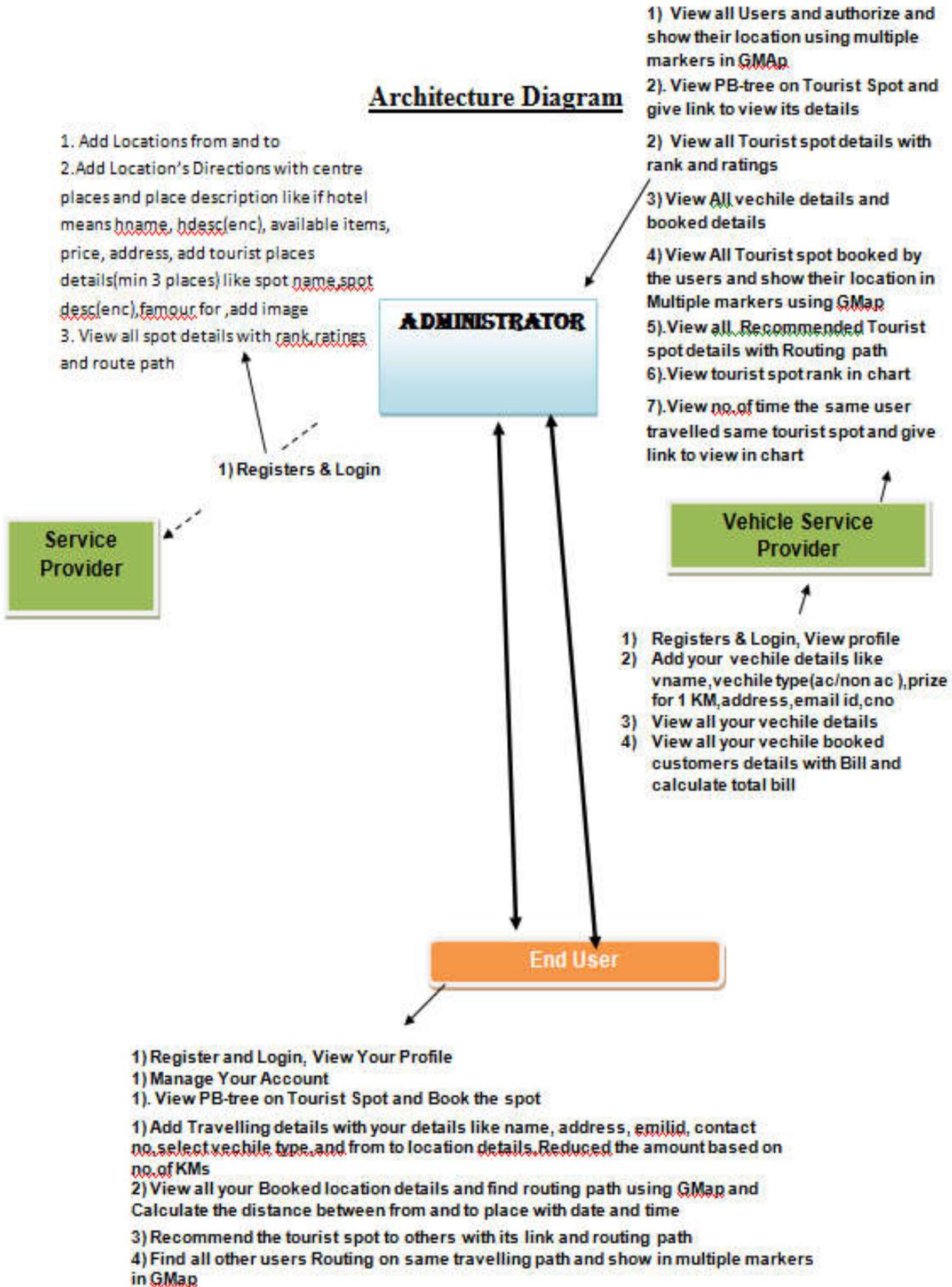
## **PROPOSED SYSTEM**

- In the proposed system, the system studies the problem of CRS on road networks, which aims to find an optimal route such that it covers a set of query keywords in a given specific order, and the matching distance is minimized. To answer the CRS query, we first propose a greedy clue-based algorithm GCS with no index where the network expansion approach is adapted to greedily select the current best candidates to construct feasible paths.
- Then, we devise an exact algorithm, namely clue-based dynamic programming CDP, to answer the query that enumerates all feasible paths and finally returns the optimal result. To further reduce the computational overhead, the system proposes a branch-and-bound algorithm BAB by applying filter-and-refine paradigm such that only a small portion of vertices are visited, thus improves the search efficiency.
- In order to quickly locate the candidate vertices, we develop AB-tree and PB-tree structures to speed up the tree traversal, as well as a semi dynamic index updating mechanism. Results of empirical studies show that all the proposed algorithms are capable of answering CRS query efficiently, while the BAB algorithm runs much faster, and the index size of PB-tree is much smaller than AB-tree.

### **Advantages**

- Efficient Routing path due to Clue-based Route Navigation to find exact Route path
- The Searching technique is fast by Greedy Clue search algorithm

### Architecture Diagram



## IMPLEMENTATION

- **Admin**

In this module, admin has to login with valid username and password. After login successful he can do some operations such View all Users and authorize and show their location using multiple markers in Grapeview PB-tree on Tourist Spot and give link to view its details, View all Tourist spot details with rank and ratings ,View All vehicle details and booked details,View All Tourist spot booked by the users and show their location in Multiple markers using GMap,View all Recommended Tourist spot details with Routing path, View tourist spot rank in chart,View no.of time the same user travelled same tourist spot and give link to view in chart

- **User**

In this module, there are n numbers of users are present. User should register before doing some. After registration successful he can login by using valid user name and password. Login successful he will do some operations like View Your Profile, Manage Your Account, View PB-tree on Tourist Spot and Book the spot, Add Travelling details with your details like name, address, emailid, contact no, select vehicle type, and from to location details, Reduced the amount based on no.of KMs,View all your Booked location details and find routing path using GMap and Calculate the distance between from and to place with date and time ,Recommend the tourist spot to others with its link and routing path, Find all other users Routing on same travelling path and show in multiple markers in GMap.

- **Service Provider**

In this module, there are n numbers of users are present. Service Provider should register before doing some. After registration successful he can login by using valid user name and password. Login successful he will do some operations like Add Locations from and to Add Location's Directions with centre places and place description like if hotel means hname, hdesc(enc), available items, price, address, add tourist places details(min 3 places) like spot name, spot desc(enc),famous for ,add image View all spot details with rank, ratings and route path.

## CONCLUSION AND FUTURE DIRECTIONS

In this paper, we study the problem of CRS on road networks, which aims to find an optimal route such that it covers a set of query keywords in a given specific order, and the matching distance is minimized. To answer the CRS query, we first propose a greedy clue-based algorithm GCS with no index where the network expansion approach is adopted to greedily select the current best candidates to construct feasible paths. Then, we devise an exact algorithm, namely clue-based dynamic programming CDP, to answer the query that enumerates all feasible paths and finally returns the optimal result. To further reduce the computational overhead, we propose a branch-and-bound algorithm BAB by applying filter-and-refine paradigm such that only a small portion of vertices are visited, thus improves the search efficiency. In order to quickly locate the candidate vertices, we develop AB-tree and PB-tree structures to speed up the tree traversal, as well as a semidynamic index updating mechanism. Results of empirical studies show that all the proposed algorithms are capable of answering CRS query efficiently, while the BAB algorithm runs much faster, and the index size of PB-tree is much smaller than AB-tree. Several directions for future research are promising. First, users may prefer a more generic preference model, which combines PoI rating, PoI average menu price, etc, in the query clue. Second, it is of interest to take temporal information into account and further extend the CRS query. Each PoI is assigned with a opening hours time interval  $[T_o; T_c]$ , and each clue contains a visiting time  $t$ , where the resulting query aims to find a path such that the time interval of each matched PoI covers the visiting time. Third, requiring users to provide exact keyword match is difficult sometimes as they are just providing “clue”, which may be inaccurate in nature. Thus, it is of interest to extend our model to support the approximate keyword match. Hence, the matching distance can be modified by incorporating both spatial distance and textual distance together through a linear combination.

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