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Enhancement of Route Saver for Location Based Services

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***Abstract*-- Now- a -days most of the peoples are using smart phones. These smart phones are equipped with GPS (Global Positioning System). So these GPS equipped Smart phones leads to huge demand for the Location Based Services (LBS). The Location Based Services are like restaurant rating websites , city guides ,traffic, shop recommendation websites. Examples: Hotels , Urban spoon, open table. These Location Based Services provides chance to the mobile users to query their Points of Interests about restaurants, cafes, hospitals, ATMs on various features like " price , quality, food type, location" etc. The users require exact query results and the results should be with up-to-date travelling times . Deficiency of the supervising infrastructure of road traffic, the Location Based Services are may take live traveling times of all routes from Google maps API's or Bing maps API's (from online route API's) to give exact results. The main aim of the my project is to decrease the number of route requests supplied by the Location Based Services , at the same time it should give exact query results. Initially , I proposed to work on new route requests from users to the online route API's ,to give accurate query results. The routes which are obtained recently from the online Route API's are providing exact travel times to give answer for present queries. This property gives us to make more effective solution for working range and K-nearest neighbors' queries.**

***Index Terms*— K-NN queries , Location Based Service, Online route API's, Points of interests .**

I. INTRODUCTION

Location Based Services are useful for the people and perfectly match for increasing or growing fast moving life, particularly or especially in large cities. The Location Based Services responds to the growing needs for mobility in city environments and for getting to destination quickly. Applications of Location Based Services are navigation, tracking, geo- tagging , Location Based Social media , marketing ,emergency, information services, mobile-location based gaming, sports, billing, augmented reality etc.

One of the most and fundamental application of LBS is utilizing the ability to locate individual calling to emergency response agency, who is either unaware of their exact location or that person not able to reveal his exact location because of an emergency condition. The user could query the Location Based Services with the simple questions concerning for example ,the address of the nearest restaurant or ATM or theatre. These services are provided by the wireless network operators.

Now-a-days most of the information is commonly delivered by the external service providers with the wireless networks via smart phone apps. The scope of information and data provided by service providers is very comprehensive manner (include everything). This data includes local street maps , wide variety of Points of interests (restaurants, cafes, stores, gas stations, hospitals , pharmacies, services, touristic attractions , real time traffic information, weather forecast etc. Presently Location Based Services are widely spreaded . We are using Location Based Services to plan and undertake journeys (for short or long distances) ,to check and view the live traffic status in a city, to find out where the nearest restaurants, hotels or shopping malls are present.

Now-a-days most of the peoples are using smart phones. These smart phones are equipped with GPS . So these GPS equipped smart phones leads to huge demand for the Location Based services. The Location Based Services are like traffic, city guides,

restaurant rating and shop recommendation websites.

LBS provides chances to mobile users to query points of interests about restaurants, cafes, theatres etc on various features like "food type, price, quality, location etc. For example, if we take a restaurant rating website , that takes various attributes into the consideration like "food type, quality, price, location " to rating that particular restaurant. The mobile user (Smart phone user) ,he could get his current location and also travelling time ,route to reach that restaurants or cafes. A successful LBS should fulfill 2 essential necessary requirements. They are accurate query results, less response time . If the query results with inexact travel times may disturb the user's schedules. Then they get dissatisfaction and the LBS may loss their users and their advertisement revenues also. The live travel times from user location to points of interests, change dynamically due to road traffic, rush hours, overcrowding and road accidents. The historical traffic information may not give accurate estimates of live travel times. If LBS estimates live travel times based on distances between user and points of interests, then the query results will be less accuracy. When a user gives query to the LBS , it calls a online route API's to obtain live travel times and routes from user query point q to each remaining points of interests and then LBS gives accurate results Examples: hotels , urban spoon, open table. These for the user. By using online route API's, they increasing disputes for the LBS in meeting the response time requirement. For LBS, it is necessary to reduce the number of route requests for answering queries, because these route request gets considerable time (0.1-0.35) , it is very high while comparing to the CPU time at LBS. Even though Spatial Mashup queries are obtaining the latest travel time for the user queries from the online route API'S . It is giving accurate query results , but it still gets a considerable number of route requests.

The travel timings are changing smoothly with in a short duration . The routes recently received from the online route API's (Example: 10 minutes ago) may still gives accurate travel times to answer current queries . The route saver method keeps the routes at the LBS, the routes which were obtained in the past δ minutes (from online route API's). Where 'δ' is the expiry time parameter. These recent obtained routes which are useful for the calculate lower or upper bounding travel times to decrease the number of route requests for answering range and K-Nearest Neighbor queries .So many people are navigating by using the smart phones.

POI ID	LOCATION	FOODTYPE	PRICE	QUALITY	T.V
P1	(4,1)	Chicken biryani	5*	3*	Yes
P2	(6,4)	Fish curry	4*	4*	Yes
P3	(5,1)	Chapathi	5*	4*	Yes

Figure 1: A restaurant rating website : Data and Queries.

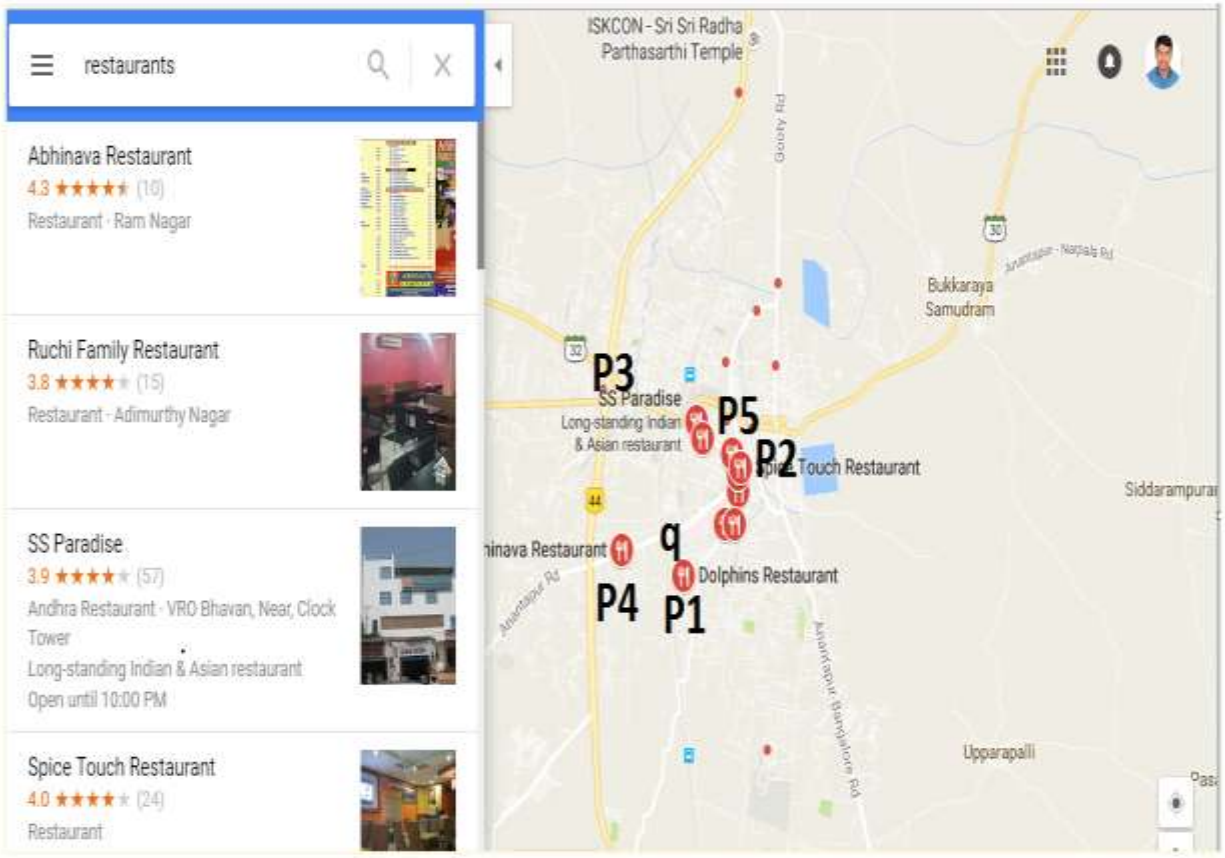

Figure 2: Points of interests and user locations.

II. RELATED WORK

Different shortest paths [2],[3],[4] have developed for efficient searching of shortest paths. The J.Jhang [5] study tells how to process k-nearest neighbors and range queries for the points of interests (POI), and also tells how to calculate shortest path distances in a road network. The users require correct results , these results are calculated based upon the live traffic information. For this the LBS need to know the travel times of road segments. Distance oracle [6], Land mark [13] can be used to calculate shortest path between two points in a road graph. Online route API's [7],[8] are accessing the live traffic information [9]. These online route API's are taking route as input , returning the route information and travel times to reach the destination. With the help of SMashQ, Spatial mashup queries are useful for the Location Based Services (LBS) to process K-nearest neighbors queries.

By receiving the k-nearest neighbors queries from the user S. The location Based Services collects N number of objects whose network distance is smaller from q. After that it sends route requests for that objects. By using bounding rectangle the calculation of lower or upper bound distances from S to D. Kriegel and Seidl[10] are proposed k-nearest neighbors searching algorithm . It will gives less number of object of the data set D. These algorithm can be improved by using lower and upper bounds. [11] Another related work tells us how the shortest paths are caching for decreasing the answering time on the shortest path inquiries. Thomsch [11] study tells us how to caching the shortest paths which were recently obtained from the Google maps API's or Bing maps

API's. But this property is not supporting to decrease the number of route requests.

With the omnipresence of wireless networks, the GPS equipped mobile devices, the Location Based Services are realized to give correct or accurate information to their users. These LBS are providing this accurate information based on their locations . These Location Based Services are the abstract entity of the spatio-temporal queries. The examples for these queries are range queries and k-nearest neighbor's queries. Ex: what are the four nearest restaurants to my location.

K. Sirish and M. Arjun[4] are proposed one system, that is based on live traffic to find out shortest path between two points on a road map network. A. Jeya Christy and R. Subhashini [5] proposed one system that is based on live traffic, to compute shortest path from source to destination. By using this function the vehicle drivers can get shortest path from source to destination.

III. EXISTING WORK

The existing system focuses on getting required locations by using user queries. Each getting location is related with query keywords ,which are close to the user destination location. In the existing system, they are developed to found shortest path from source to destination.

The existing work also tells us how to process distance related queries and also k-nearest neighbors queries based on the users points of interests. It gives closest point of interests by using network distance from users locations.

IV. PROPOSED SYSTEM

If a person wants to reach nearest restaurant or ATM, then he can get restaurant or ATM information by using internet. But he wants more accurate results like travel time and shortest path. But these work done by the Location Based Service application, that gives all the required results.

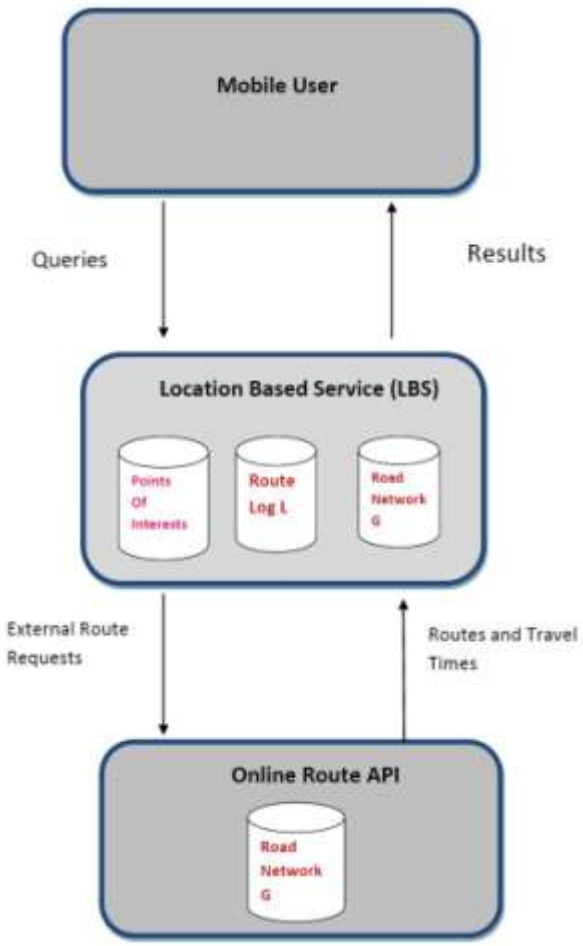

Figure 3: Proposed System Architecture.

The figure 3 shows the architecture of the proposed system. The proposed system having 3 modules, they are user module, Location Based Services Module and Route saver module. The mobile user can get his current location and he can issue queries to the Location Based Service. In my proposed work, the mobile user can get accurate results based on live traffic information. So the Location Based Service provides query results based on the mobile users points-of-interests like restaurants, cafes, hospitals, ATMs etc. Because the Location Based Services having restaurants, cafes, ATMs information. These LBS application stores all routes obtained from online route APIs with in the last intervals of time units (δ) . The road network consists of conservative

lower bound and conservative upper bound. Here each edge tagged with tuple.

$$(c\omega^{-}(e), \omega(e))_{\mu(e)}$$

Where ,$c\omega^{-}(e)$ is a conservative lower bound

$\omega(e)$ is a exact travel time

$\mu(e)$ is a last update time stamp

Example for an edge : $(10,15)_1$

For any successful system must have two necessary requirements. They are accurate query results and reasonable response time. Live traffic information affected by the sudden events like road accidents, traffic jam, road maintenance, overcrowdings etc. So, if the query results are having inaccurate travel timings, these may disturb the mobile users schedules. The users will be dissatisfy, it may leads to loss of its (LBS) users and their advertisement revenues also. So my main objective is to decrease the response time of mobile user's queries and also we need to minimize the route requests to online route APIs from Location Based Services or Application. So to get lower response time we need to take the help of route log information, road network and also we can reduce the number of external route requests to the online route APIs .At Location Based Service the maximum driving speed is limited by the Euclidian distance of "e" ,that is "V_{max}" .

$$c\omega^{-}(e) = dist(e)/\mathbb{V}_{MAX}$$

So to overcome the limitations of the existing work, in my proposed work I am using automatic tuning the expiry time for all route logs (which are in LBS application), which are obtains from the online route APIs with in the regular intervals of time (δ). Within this regular intervals of times, if mobile user sends query to the Location Based Service, then LBS checks for the route if it is in the route log. If it is present it will sends immediately to the user. Then response time will be decreased, otherwise LBS sends route requests for the online route APIs. Then online route APIs are automatically calculate shortest path between two points that is from source to destination. Then LBS sends these results to the mobile users. Then numbers of route requests to the online route APIs from LBS are decreased. Then response times for user queries are minimized.

Algorithm: Route saver algorithm for KNN- queries

1. First we initialize the candidate set 'C 'with The data set P.
2. Then inserts 'K' dummy pairs into the result set 'R'.
3. Set 'Y' to the largest travel time in 'R'.
4. The first phase :

   The 'Y' is set to the largest travel time in result set 'R'.
5. The second phase:

   It eliminates the candidates whose lower bounds or exact times are larger than 'Y'.
6. The third phase :

   It examines the candidates according to certain order and issues route requests for them.

Finally the algorithm terminates when the candidate set contains exactly k objects and then reports them as query results.

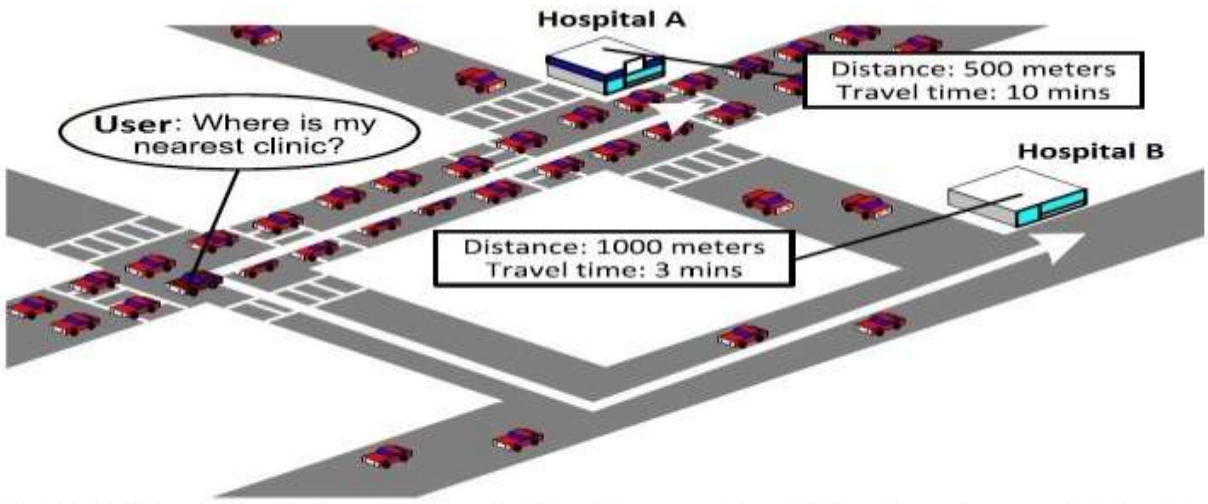

Figure 4:Shortest-path-based nearest object **A** versus travel-time-based nearest object **B**

The above figure 4 gives us one example, here smart phone user wants to find the nearest hospital for emergency treatment . Here the KNN query algorithm returns the hospital A. But travel time based KNN query algorithm returns the hospital B. Because smart phone user will take less time to reach hospital B(3 minutes) than hospital (10 minutes) .So travel timings are more dynamic.

V. EXPERIMENTAL RESULTS

In this experiment measured the accuracy of Route Saver, SMQ, NO API. The figure 5 showing the average accuracy of three methods of a day. If we are not using API, then it is having low accuracy, because it doesn't using current traffic information. So in my proposed work RS having high accuracy when compared to the NOAPI. When expire time increases, then route log get low accurate travel time information, then accuracy decreases. The figure 5 showing the accuracy of route saver method and NO API with the time line. Traffic varies more quickly during morning and evening times.

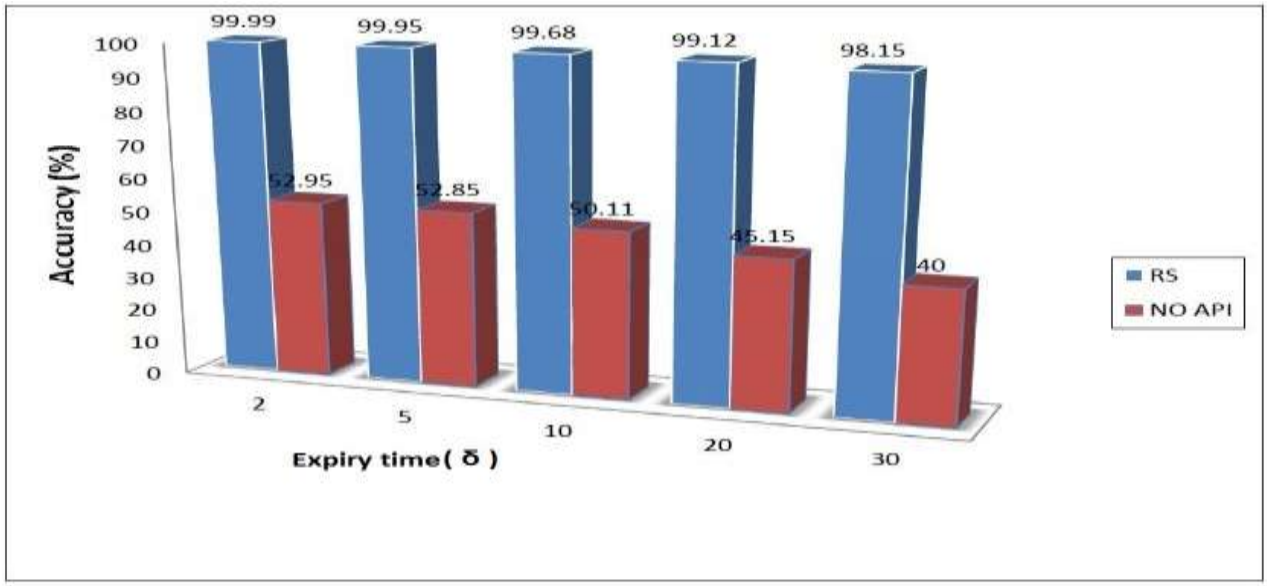

Figure 5: Average accuracy (%) on a day.

The figure 6 showing the mean of route requests and KNN queries with respect to the several expire times (δ). SMQ is not using route log information, so its cost is constant and high when compared to the RS. So route saver accomplishes lower server CPU time (0.1s) and also the user response time (1s).

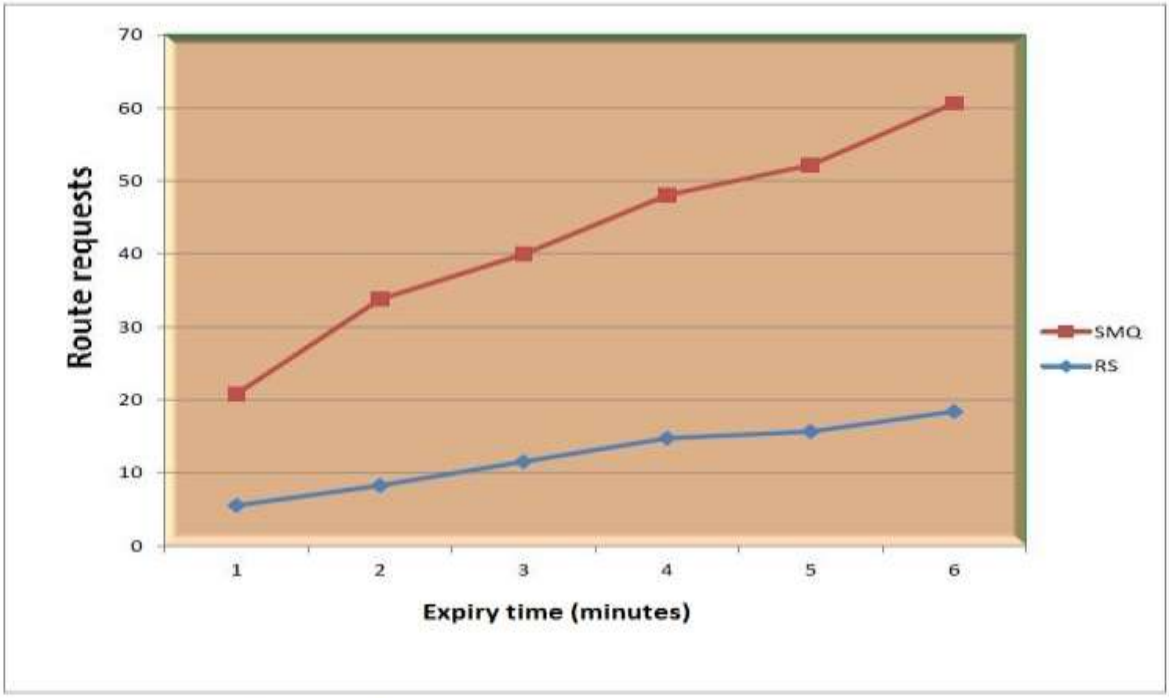

Figure 6: Route requests (KNN)

VI. CONCLUSION

Due to sudden raise in usage of smart phones and GPS-equipped devices, less cost wireless networks, Location Based Services have become omnipresent. The Google maps used most in smart phones in 2013, to find nearby locations or POI (Ex: ATMs, Restaurants, Hospitals, cafes, colleges, hostels etc) by using Google maps based on their (users) Points of Interests. Location Based Services are quickly rising as a large area of deployment of geographical and data management techniques. My proposed system delivers accurate query results and reasonable response time for user queries. Comparing to the existing system my proposed work delivers more accurate results to the users. So user satisfaction will be increased. In my proposed work decreased the number of route requests supplied by the Location Based Services and at the same time it is giving exact query results. The routes which are obtained recently from the online route API's are providing exact travel times for the present user queries.

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