



Android Based Continuous Query Processing in Location Based Services

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Abstract— *The continuous query processing in location based services based on the state of the mobile user at the time of query submission. Several aspects have been proposed to process continuous queries in mobile networks. The proposed system is an Android based Mumbai City Guide application which designed to process location based continuous query on the road network. Somebody when visit places such as Hotels, Colleges, Hospitals, and Schools do not need to hire special person who give guidance. If all the information must be available on a mobile device with the user customized format, then it's helpful to manage their valuable time effectively and efficiently.*

Keywords— *LBS, Continuous Query, Range Query, Google API's, GPS.*

I. INTRODUCTION

In recent years, mobile computing provides database applications with useful aspects of wireless technology, and focuses on querying central database servers is referred to as mobile databases [1]. Mobile service providers are establishing a number of data services including weather information or weather forecast services, news, tourist services, route guidance, and so forth. These services face location based query processing issues in mobile computing [2].

Location based applications (LBA) provides location based services (LBS) by using queries called location based queries (LBQ) [6]. LBQ needs Location Dependent Data (LDD) for computing the result. For instance, what is the distance from the airport to here?, is a location dependent query because the value of the distance depends on the geographical location of the mobile unit which initiated the query. If the coordinates of the location "here" is not known, then the query cannot be processed. Each answer to this query will be different, but correct because the geographical location of "here" is continually changing. Thus, to process LBQ, the necessary LDD and geographical coordinates of the origin of the query must be known.

LBQ's can be classified into two categories [7]. The first category is based on user and object types, and the second is based on query types. User and object types represent the state of the mobile user, when issuing the query and the searched object. The query type relates to the state of the queries whether continuous or non-continuous queries.

A continuous query is very much different from conventional queries; with this query the clients need to send a query only once and notification of the updated information about nearby tourist attractions, hotels, or shopping center will be sent automatically as clients move to different regions. It might be Range query and Nearest Neighbour query.

The structure of the paper is as follows: section 2 describes Background, section 3 Proposed Methodology, section 4 Result and Section 5 Concludes with future evaluations.

II. BACKGROUND

The location based query result depends on the location of the objects involved. Location based queries (LBQ) is range query, nearest neighbor query, navigational query, continuous range query, continuous nearest neighbor query [2] [4] [7]. Location dependent queries are considered as continuous queries. The previous sample query answer must be continuously refreshed because it can change immediately due to the movements of people or mobile object. To process a continuous range query for moving objects on the road network Haojun Wang, defined approach using dual index structure and introduced a Shortest-Distance-based Tree (SD-Tree) to preserve and reused the network connectivity and distance information can when the query point location is updated, hence reduces the continuous query update cost [3].

LBS used various techniques to determine the location of mobile unit automatically. Typically mobile cellular network or GPS (Global Positioning System) has been used. Built-in GPS enables applications to take a user's location into account, and combined with constantly emerging wireless technologies are creating an opportunity to make very powerful personalized mobile services [6] [12]. Location-based and personalized services such as a tourist guide and city guide have been developed by using mobile application development technologies like WAP, J2ME and present in Android [9]. Existing information guides used GPS for localization and mobile Internet for retrieving Google Map. These assumed a tourist or visitor, as a mobile user. It focused on to provide tourists or visitors with up-to-date and location-aware information about a city via a mobile device [9] [10].

The existing city guide application included basic functionalities such as showing a map, locating points of interest (POIs) on a map, locating location of a user, retrieving information of POIs, show route direction to POIs, adds a reminder, and choose different kinds of POIs to show on map [8]. It uses GPS to locate a mobile user and calculate distance between two points by using great circle distance formula; which retrieves the air distance, not a road network distance.

III. PROPOSED METHODOLOGY

In recent years, mobile users are willing to subscribe to many location based mobile services, such as location-based games, location- sharing social networks, road-side assistance, tourist guide or city guide, etc. LBS become key functionality that gets used in Smartphone applications.

When people visit to unfamiliar cities, they required the proper guidance to visit various places or historical points of the city. This is totally time consuming, wasting of money and risky as point of security. The main objective of the proposed system is the design of City Guide mobile application for processing location based continuous query. The user should have a simple, informative graphical interface that is appropriate for any Android mobile device. The application should serve as a genuinely helpful and informative tool for both locals and visiting people. Therefore, the people who are visiting Mumbai can manage their valuable time as well as the money in the way of effectively and efficiently.

The proposed system work is carried out in the following steps:

1. The user has options like to check his/her current location on Google Map located by marker, finding the most popular and known sites like schools, colleges, hotels, and hospitals those are near or comes within a specific range as per current location.
2. Database server evaluates user request as a query by applying the current location information of users
 - a. Location information updates continuously as per the change of location of moving mobile user.
 - b. Find the road network distance from current location to interest point by using the Google API Services.
3. Once the query has been submitted; every time the result of it reevaluated as per changed location, and passed to the mobile user.

The proposed system has been implemented using the Android SDK with the Eclipse IDE and AVD (Android Virtual Device) emulator [9]. An emulator provides the android hardware and software environment to test applications on the computer. In Eclipse, the application is run under Windows -> Android SDK and AVD Manager.

The overall system architecture is divided into three independent parts respectively, as shown in Fig.1, which is benefited for data storage, processing and displaying results.

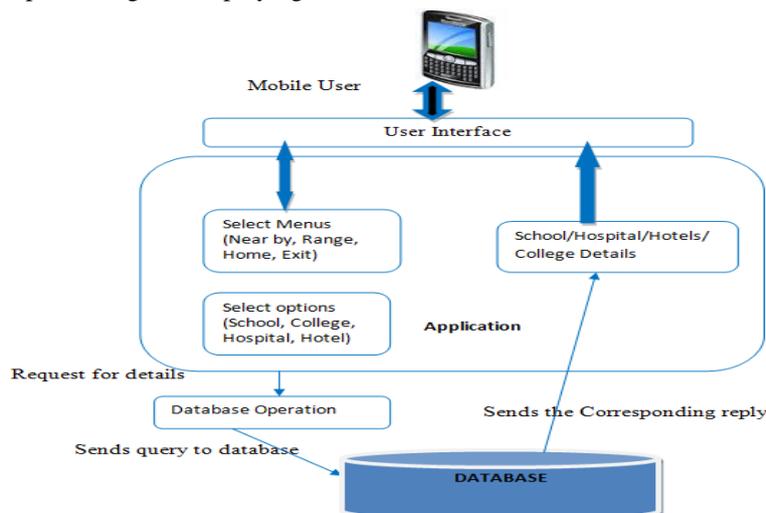


Fig.1. System Architecture Diagram

The client is android mobile and on the server side has PHP script (Web Services) with MySQL database server. It contains a number of components, including Geographical Information System (GIS) information, location collection services using Google API services, and application specific subcomponents.

There are the different classes present under Google API Services package to retrieve and manage the location information of the mobile user.

Location Manager- This class helps to manage all elements needed to establish a location based services.

LocationProvider- It's an abstract super class for location providers. It determines available provider and selects suitable one to determine the physical location i.e. to handle GIS.

LocationListener- This class provides callback methods which are called when location gets changed. The listener object has to be registered with the location manager. The Google Map API [13] is a service that returns data about places-defined within web services, as spatial locations or the preferred point of interest using HTTP requests. That is, the users set up a query and make an HTTP request to the API using the client URL (curl) PHP library. The response returned in JSON that is JavaScript Object Notation. The database server stores the information about various places that is Latitude, longitude, address, name and access count. The location points have been detected by Global Positioning System (GPS). The moving mobile user updated location sends to the server with the NN and range query. Once the user location changed, it has been submitted to the server for calculating the results of a query. The user has been getting different but accurate result of, submitted query as a location of the user get change. The application provides service to navigate path on Google Map for selected query result from current location to selected destination.

IV. RESULT

All The performance testing of mobile application faces a variety of challenges due to unique features of mobile devices, limited bandwidth, unreliability of wireless networks, as well as the changing context. Also, there are several restrictions of wireless network need to be carefully evaluated by service providers: restricted energy capacity, limited computing power, amount of memory and storage space, and high cost of wireless connections. The application is compatible with Android Version 2.2 and above. It has been tested using the LG handset. The City Guide application provided an intuitive interface with a simple menu. So that interaction with application requires minimal effort and does not distract the user's attention from other activities.

The location of user fetched through Global Positioning System (GPS). The system constantly monitors the user's location. The user interface and user's current location showed on Google Map, as shown in Fig. 2.

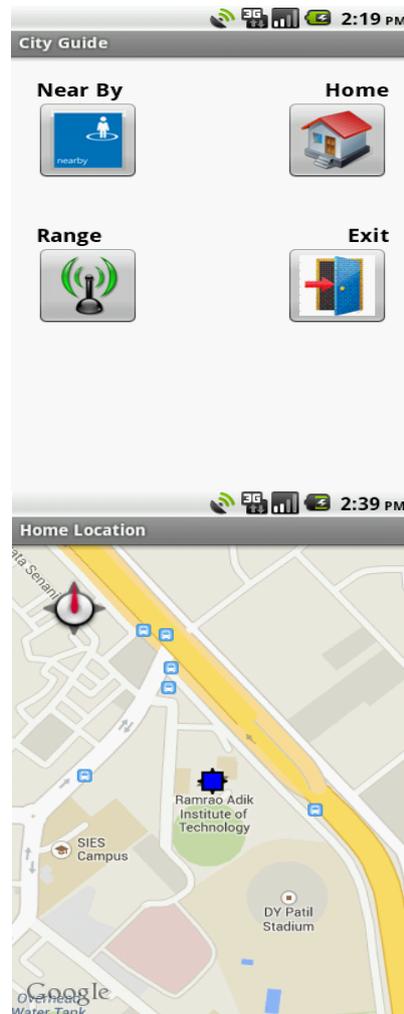


Fig. 2 The screen shows a) Menu Screen b) Current Location of Mobile User

The mobile user can be request to search nearby or within a specified range point of interest, as shown in Fig. 3.



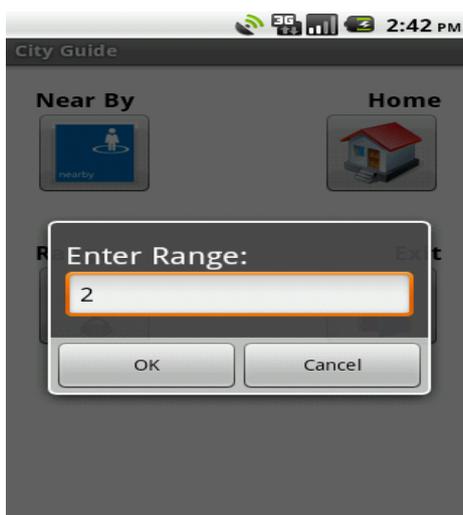


Fig. 3 a) List of Places b) Prompt to Enter Range value in Km.

The result of a query as per user's current location information has been displayed, as shown in Fig. 4.

The list of Nearest hospitals
Terna Dental Hospital
Terna Sahyadri Speciality Hospital and Research Center
Manak Healthcare Hospital
Meenatai Thackeray Hospital
Millenium Lifeline Hospital
Mgm Hospital
Lotus Hospital
PKC Hospital
Saroj speciality Clinic

Fig.4. Search Result

The user can navigate from current location to selected destination with the help of Google Map, as shown in Fig. 5.



Fig.5. Navigate using Google Map

Advantage: The system is beneficial for the user; in case of emergency, anyone can find the nearest hospital.

Limitation: It consumes more mobile battery due to use of built in GPS and GPRS or WI-Fi.

V. CONCLUSIONS

The growth in the number of mobile users motivated the new technologies in mobile computing to provide various location based services. Location based query evaluation is challenging issue in LBSs. LBQ are totally based on Location dependent data, where location or geographical area is changeable as per the movement of mobile user. The Proposed system evaluated continuous location based queries through location based mobile application which has inbuilt GPS for localization and Internet for accessing remote information about point of interests. It will allow any user to search any place in particular range. The system helps people to stay fast and search places in very fast and cost effective way.

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