

Proxi Hunt – An Advertisement Within Proximity

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Abstract: Advertisements or vouchers are commonly used today to attract the attention and the purchase of consumers by providing discount or detailed description to customers. Typically, vendors use text to describe characteristic introductions and images to express appealing looks. In order to allow consumers to retrieve more information such as location of vendors, an advertisement publishing system should be improved to meet the consumer's requirements. In this paper we introduce the Mobile Yellow Pages with User interest and Location Sensing Ensemble (Proxi Hunt) system which enables a user to see advertisements biased on their area of interest and obtain other important information about products and services offered by vendors such as local business, restaurants, hotels, shops, taxicabs, etc. Providing a powerful Android app in the hands of User to edit the choices of advertisement and providing an efficient, effective and reliable service to vendors by using both Android operating system & Java technology emerges as one of the hottest topic in the field of Information Technology.

Keywords: Android O.S, Location based services (L.B.S), Web Services, A-GPS

I. INTRODUCTION

In today's world context-aware mobile applications are very popular as they promise richer interaction by taking environment context into account. Context-aware application take into account the user's current context (e.g. the location). In interactive applications the user of context is very important. It is particularly important for applications where user's context (e.g. the location) is constantly changing i.e. mobile applications. Location-based services (LBS) provide the mobile clients personalized services according to their current location. They also open a new area for developer, cellular service network operators, and service provider to develop and provide value-added services: advising clients of current traffic conditions, providing routing information, helping the users to find nearby shopping malls. Location-based services offer many merits to the mobile clients. For the mobile user, the examples of location based services [2] are:

- Profile changer based on place or area
- Person Location tracking by Family Member(SMS)
- Nearest Friends notification reminder

Location based Services can be classified in 3 categories

a) Public Safety / Emergency Services

The location of the client can be determined by the mobile carrier hence it finds great use during Emergency since I can be used during the emergency/health hazard to locate the mobile clients.

b) Consumer Services

Now days, smart phones like (Android, Blackberry and iPhone) provide a set of location based applications and services which helps the users to access the multiple services based on the user location.

- *Maps Navigation-* The users can use the Google Maps to get to the particular location or to trace the route between any two locations.

- *Marketing /Advertising-* Many corporate companies advertise their items based on the location of the clients. For Example – Sale in Shopping Mall near to your location.
- *Location based Reminders-* The phones can be used to set as the reminder based on the location.
- *Preferred Location Search-* The user can also initiate the search of any nearby ATM or Restaurant within 5/10/15 kms range from his current present location. There are two methodologies to implement LBS [3]-
- To process location data in a server and to forward the generated response to the clients.
- To find location data for a mobile device-based application that can use it directly.

To discover the position of the mobile, LBS must use positioning methods in real time. The accuracy of the methodology depends on the approach used. Locations can be represented in spatial terms or as text descriptions. A spatial location [1] can be represented in the used latitude-longitude-altitude coordinate system.

Latitude is defined as 0-90 degrees north or south of the equator and longitude as 0-180 degrees east or west of the prime meridian, that passes through the Greenwich, England. Altitude is represented in meters above sea level. A text description is usually defined as a street location, including city, pin code.

The location of the device can be retrieved by-

(i) Mobile Phone Service Provider Network-

The current cell ID is used to locate the Base Transceiver Station (BTS) that the mobile phone is interacting with and the location of that BTS. It is the most basic and cheapest method for this purpose as it uses the location of the radio base station that the cell phone is connected to.

A GSM cell may be anywhere from 2 to 20 kilometres in diameter. Other approaches used along with cell ID can achieve location granularity within 150 meters. The granularity of location information is poor due to Wide Cell Range. The advantage is that no additional cost is attached to the handset or to the network to enable this service.

(ii) Satellites

The Global Positioning System (GPS) uses a constellation of 24 satellites orbiting the earth. GPS finds the user position by calculating differences in the times the signals, from different satellites, take to reach the receiver. GPS signals are decoded, so the smart phone must have in-built GPS receiver.

Assisted-GPS (A-GPS) is the new technology for smart phones that integrates the mobile network with the GPS to give a better accuracy of 5 to 10 meters. This fixes the position within seconds, has better coverage and can, in some cases, be used inside the buildings, consumes less battery power and requires fewer satellites. The granularity of location information is most accurate (Latitudes and Longitudes). The disadvantage is cost of AGPS enabled handsets for the user.

II. BACKGROUND

Interest as the mobile subscribers have reached about 5.3 billion (77% of world population) by the end of 2010 [1]. Mobility and broad reach are the two major values of mobile devices that encourage businesses to communicate with customers in one to one marketing strategy. One to one marketing segments the market to the size of one by personalizing their offers according to customers' preferences, information and needs.

In a survey classifying and defining the concepts of mobile marketing and mobile advertising [2], mobile marketing was defined as "using a wireless medium to provide consumers with time and location sensitive, personalized information that promotes goods, services and ideas, thereby benefiting all stakeholders" and mobile advertising as "the business of encouraging people to buy products and services using the mobile channel as a medium to deliver the advertising message" this definition has also approved by the Interactive Mobile Advertising Platform [3]

From the two definitions the relationship between mobile marketing and mobile advertising appears to be hierarchical. Mobile marketing adopts the whole process; creating, communicating and delivering the service or product to the customer. In the other hand, mobile advertising restricts the process on communicating customers. [4] Has argued that mobile marketing should be a subset of mobile commerce. This is not true because mobile commerce recommends a monetary value transaction [5], unless mobile commerce is defined as "any kind of business transaction, on the condition that at least one side uses mobile communication techniques". According to all previous definitions, Proxi Hunt adopted mobile marketing concept because it covers the supplier customer relationship in general.

III. LBS COMPONENTS AND SERVICE PROCESS

LBS service is supported by some infrastructure components as listed below: [3].

Mobile Devices: Access to the LBS services is provided with the help of Mobile devices, to send requests and retrieve results for the users. This mobile device can be in the form of mobile phones, tablets, portable navigation devices (PNDs), and so on.

Applications: Applications is nothing but the software developed by an application developer or provider which is downloaded and installed on the user's mobile device, which also provides the interface to access LBS services.

Communication network: Communication network as explained above is the mobile network which transfers service request from user to service provider, and requested information back to the user [2].

Positioning component: To track user's current location, positioning component is needed in the LBS application, since it is not feasible for users to input location manually and then give it to LBS services. Instead some positioning technologies, such as satellite positioning, cellular network positioning can be used to obtain user's location must be capitalized except for short minor words.

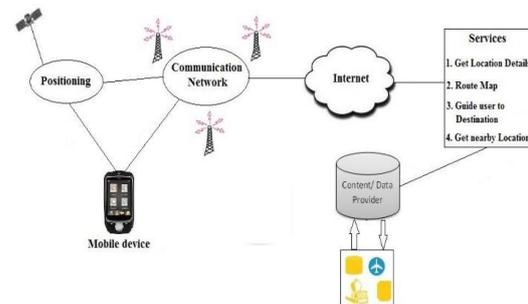


Figure 1: LBS Process

Following are the steps for LBS Service process as shown in Figure 1:

Step1: User sends a service request to service server using the LBS application running on the mobile device.

Step2: Along with the service request, user's current location information is retrieved from positioning component and sent to the service server using communication network.

Step3: Service server now analyses the geo-specific information requested by the user and then asks for relevant data from content or data provider (for example, geographic databases).

Step4: Finally, the requested information is sent back to the user's mobile device through mobile communication network.

IV. IMPLEMENTATION AND METHODOLOGY

The Proxi Hunt Project is a new product that is part of a larger, more complete product for our customer. This

system will consist of two parts: one mobile application and one web portal. The mobile application will be used to find advertisement and view information about them while the web portal will be used for managing the information about the advertisement and the system as a whole. The mobile application will need to communicate to a GPS application within the mobile phone, which in turn communicates with a physical GPS device to find the location of the user, see Figure 2. The GPS will provide the mobile application with locations of both the user and the vendor shop and the distance between them, but it will also provide maps and the functionality to display the application's data on the map. The functionality provided by the GPS will be embedded into the application in order for the user to be able to use the functions in the application in a seamlessly manner.

Since this is a data-centric product it will need somewhere to store the data. For that, a database will be used. Both the mobile application and web portal will communicate with the database, however in slightly different ways. The mobile application will only use the database to get data while the web portal will also add and modify data. All of the database communication will go over the Internet. Location-based service is another key functionality that gets used in smart phone applications. It is often combined with maps to give a good experience to the user about their location.

Android support LBS Application Programming Interfaces (APIs) [7]. Location service allows finding out the device current location. The application can request for periodic update of the device location information. The application can also register a intent receiver for proximity alerts like

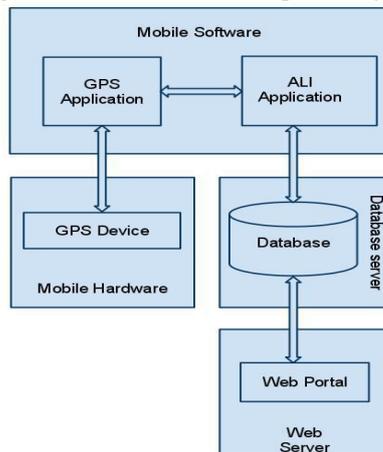


Figure 2: Block Diagram

when the device is entering and existing from an area of given longitude, latitude and radius.

4.1 Android Location API

These are the different classes present under Location API package to retrieve the Location information of the user. [7]

- *LocationManager*- The class provides access to the location service. It also provides facility to get the best Location Provider as per the criteria.

- *LocationProvider*- It's an abstract super class for location providers. A location provider provides periodic reports on the geographical location of the device.
- *LocationListener*- This class provides call back methods which are called when location gets changed. The listener object has to be registered with the location manager.
- *Criteria*- The class provides the application to choose suitable Location Provider by providing access to set of required properties of the Location Provider. Android also provide an API to access the google maps. So with the help of the google maps and the location APIs the application can show required places to the user on the map.

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4.2 Google Places API

On 10 May, 2011, at the Google I/O developer Conference in San Francisco, Google announced the opening up and general availability of the Google Places API. The Google Places API [8] is a service that returns data about Places - defined within this Web Service as, spatial locations, or preferred points of interest - using HTTP requests. Place response specifies locations latitude/longitude coordinates.

The four types of requests are available with the Google Places API. There are 4 fundamental Place services available:

- *Place Searches* - It returns an array of nearby Places based on a location defined by the user.
- *Place Details* - It returns more specific data about a user defined Place.
- *Place Check-ins* - It allows the request that a person has checked in to a Place. Check-ins is used to gauge a Place's popularity; frequent check-ins will boost a Place's priority in application's Place Search responses.
- *Place Reports* - It allows the users to add new locations to the Place service, and to delete Places that the application has added to the database.

The Google Places API [3] has the following limitations on the query processing:

- Users are allowed only 1000 requests per 24 hour period which are having the API Key.
- Clients who have also validated their identity through the APIs console are allowed 100 000 requests for 24 hours period. A credit card is required for authentication, for enabling billing.

4.2.1 Place Searches

A Place Search request is an HTTP URL defined in the following way [8]:

<https://maps.googleapis.com/maps/api/place/search/output?arguments>

Where output may be either of the following values

- json shows the response in JavaScript Object Notation (JSON)
- Xml shows output as XML.

Table 1: Place Search API Arguments

Arguments	Description
Location (required)	The latitude/longitude about which place information is to be found out. This must be defined as latitude, longitude.
Radius (required)	Distance (in meters) about which to show Place results.
types (optional)	Limit the results to places matching at least one of the pre-defined types. Types must be separated with a pipe notation (type1 type2 etc).
Language (optional)	The language code, showing in which language the results must be shown, if possible.
name (optional)	A term to be mapped against the names of Places. Results will be limited to those having the name.
Sensor (required)	Indicates whether or not the place request is from the device having a location sensor (e.g. a GPS) to find the location sent in this request. This value is
key (required)	Application's API key. The key determines your application's identity so that places added from the application are made

4.2.2 Place Details

A Place Details [8] request returns more detailed information about the user defined place such as its address, contact number, user rating, etc.

Once we have a Reference Number of Particular Place from Place Search Request, we can initiate the search about that place details.

A Place Details request is an HTTP URL of the following form:

<https://maps.googleapis.com/maps/api/place/details/output?arguments>

- json (recommended) shows the output in JSON
- xml gives output as XML.

Arguments	Description
reference (required)	A identifier that uniquely defines a place, given from a Place search request.
language (optional)	The language code, showing in which language
sensor (required)	Defines whether or not the Place Details request is from the device having a location sensor
key (required)	The application's API key. This key identifies the application for purposes of quota management.

V. CONCLUSION

There are various constraints to implement Location Based Services. The different kinds of constraints include [1]:

Technology Constraints

For LBS to be operational on a large scale, mapping under the geographical information system (GIS) needs to be more comprehensive than it is today. This raises significant challenges in for improving the breadth and the depth of the existing coverage of GIS. The most important factor in enabling the growth of LBS is wide availability of cheap GPS enabled handsets. GPS enabled handsets are

being manufactured now days. The issue of cost remains to be tackled, since these phones are still all high-end units.

Infrastructure Constraints

One of the main problems is the lack of spread of the wireless network into the countryside. In developing country like India, the wireless technology is in very nascent stage. In metro cities and areas, the problem of network congestion is also an important issue. The percentage of service operators not meeting the congestion rate benchmarks has risen substantially.

Market failure

One of the main constraints to the provision of value added services, in general, and LBS in particular, is the market structure of the mobile industry and the failure to unleash the forces of competition. A key essential need for LBS provision needs cross-network connections to be seamless, and the current practices go against a cooperative attitude for LBS provision.

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