

Review Article

Review of Location based Services using Contexting with Levels of Adaption

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Accepted 22 March 2015, Available online 29 March 2015, Vol.5, No.2 (April 2015)

Abstract

Location Based Service (LBS) is a kind of service that helps in providing the geographical situation of person. By using services it is easy for the users to search and locate other persons, vehicles, resources and to provide location-sensitive services, also to track their own location immediately. The request for location can supervise in the mobile device or in another entity like application provider or network operator. These services represent a novel challenge both conceptually and technically. Providing users with added value to mere location information is a complex task. People always keep cell phones, laptops, tablets etc. A lot of information related to the user of the mobile device can be collected. The knowledge of mobile user's location can improve the class of services and applications that can be provided to the cell phone user. These types of applications and services are termed as location-based services. This paper focuses on LBS in detail, their architecture and different components of LBS also understanding the context part with different levels of adaption in location-based services and how adaption responding their services to context.

Keywords: Adaption, Context, Location Based Services(LBS), LBS Architecture, LBS Components

1. Introduction

Location-based services or LBS(Prof.Seema Vanjire, UnmeshKanchan, GaneshShitole,Pradynesh Patil,2014) refer to-a set of applications that develop the knowledge of the Geo graphical position of a mobile devices in order to provide services based on that information. Location based service (LBS)(Amit Kushwaha,Vineet Kushwaha,2011) is rising as a killer application in mobile data services thanks to the rapid or fast development in wireless communication and location positioning technologies.

“Open Geospatial Consortium” (Amit Kushwaha, Vineet Kushwaha,2011; Consortium,2005) defined LBS service similarly: “A wireless-IP service that uses geographic information to serve a cell phone user, any service that misuses the position of a mobile terminal.”

Basically in smart phones we can have location based tracking system it also called LBS(Sharad Gadhe, Mayur Chaudhari, Ajay Gaikwad ,Ajit Patil, Pradnya Kasture,2014) that is the Location Based Technology to provide more security to smart phones. A Location Based Service (LBS) is an information or knowledge and entertainment service, accessible with cell phone devices through the mobile network and utilizing the ability to make use of geographical position of the cell phone device. A LBS services can be used in a range of contexts, such as health, work etc.

For the mobile user, the examples of location based services (Nilima Walde, Pravindra Singh Khatri, Dheeraj Mehta, A V Avinash,2014)are:

1. To determine the nearest business, such as an Industry.
2. Receiving alerts, such as notification of Sale in Shopping Mall or news of traffic Jam nearby.
3. Friend finder or receiving the location of the stolen phone.

LBS give the possibility of a two way communications and interaction. Therefore the person tells the service provider his/her actual context like the kind of information he/she needs, his/her preferences and his/her position. This helps the provider of such location services to deliver information tailored to the user needs. These communication forms are usually one way communications LBS open a new area for creators, network operators, and service providers to develop and provide value- added services(Xu, H., Teo, H.-H., Tan, B. C., &Argawal, R.,2010).

Table 1 Categories of Location Based Services.

Categories of LBS	Description
Business to Business	The business to business services include fleet tracking, courier/dispatcher tracking, and others.

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Business to Consumer	Business to consumer services includes pushed ads based on the location, where a user will receive ads most relevant to the location.
Consumer to Business	Consumer to business services includes location based search, where a user is searching for the nearest restaurant, petrol pump, and so forth.
Consumer to Consumer	Consumer to consumer service is the friend finder service where the user will be alerted if his friend is within a few meters

1.1. Objectives

1. It supports to the growing market of location based services by using their various applications in next generation.
2. An understanding between past and next-developing services in LBS at different context.
3. For Gaining further insight into possibilities for smart phones next-generation in LBS applications, especially for enterprise scenarios.
4. Pushing information out to users which is based on their location. Allows users to be notified when the LBS application is not running.
5. Capable for storing and using location trace information.
6. Services responding to contextual information using at different levels of adaption and improvements in visualization.

2. Related Work

A location based information are not a new thing which came up with the inventions of mobile phones.

Location based services in today’s world is a part of everything from control systems to smart devices. They are actively used trillions of times a day and may be one of the most heavily used application-layer decision framework in computing today.

In 1990 ITS, introduced the world's first dynamic real-time stolen vehicle recovery services and they started developing location based services which transmit location information.

In 1997, the Location Services (LCS) joint ETSI and ANSI. This group selected positioning methods and standardizes Location Services (LCS), later known as Location Based Services (LBS).

In 2000, the first Digital Location Based Service Patent was organized in the US and ultimately accepted after nine office actions in March 2002.

Foursquare was launched in March 2009. Foursquare is the biggest and fastest growing Location-Based Social Network.

There are two types of information delivery mechanisms commonly used for LBS – pull or push(Xu, H., Teo, H.-H., Tan, B. C., &Argawal, R.,2010). The pull-based LBS is a type of LBS which is user initiated. Users request for particular information or service by

voluntarily providing their location information(Xu, H., Teo, H.-H., Tan, B. C., &Argawal, R.,2010; Xu, H., Gupta, S., & Shi, P.,2009). For example, users provide their location information to receive real time navigational requests to the nearest auto-teller machine(Xu, H., Gupta, S., & Shi, P.,2009).

In contrast, the push based LBS is a type of LBS which is service provider initiated. Through positioning technologies in mobile devices, a service provider is able to sense the location of users and sends relevant information or service to the user based on the user’s location(Xu, H., Teo, H.-H., Tan, B. C., &Argawal, R.,2010).

In order to provide a successful LBS technologies the following factor must be met:

- Coordinates correctness need that are decided by the relevant service;
- Lowest possible cost;
- Minimum impact on network and instruments.

3. Working

3.1. LBS Architecture

Fig.1 shows the relations among these components and the process of a LBS services. LBS Architecture can easily understands by following steps (Amit Kushwaha, Vineet Kushwaha,2011).

- **Step 1:** User sends a service request to service server using the LBS application running on the mobile device.
- **Step 2:** Along with the service request, user’s current location information is retrieved from positioning component and sent to the service server using communication network.
- **Step 3:** 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).
- **Step 4:** The services server request, geographic databases and other related database to get required information
- **Step 5&6:** The requested information is sent back to the user’s mobile device through mobile communication network.

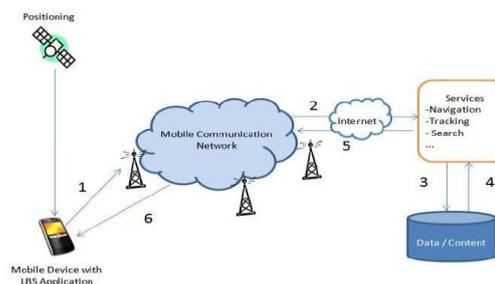


Fig.1 LBS Process (Seema Vanjire, Unmesh Kanchan, Ganesh Shitole, Pradnyesh Patil, 2014; Amit Kushwaha, Vineet Kushwaha, 2011)

Table 2 Components of Location Based Services.

Components	Description
LBS Application	This represents a specific application such as a –environmental application. This lie on a Smartphone component, which has a lots of sensors, and capability of a server component that includes application specific data (such as location-tagged information).
LBS Middleware	This covers access to Core LBS Features (Location Tracking, GIS Provider and Location Collection Services) to provide a consistent interface to LBS applications.
Location Tracking	This component stores the location trace of individual users. This shows a fundamental component in next-generation LBS as it contains the data that allows a user’s route to be determined and potentially predicted. 1. Keep records on user’s current and past locations. 2. Advise other components when a specific user has moved, or when they move out of an area. This assist location-based notifications being sent to users. 3. Determine which users are within a defined location this supports geo casting features. 4. Queries of location trace to generate user movement models.
GIS Provider	This component provides geospatial functionality for many LBSs including map indication, map representation and directory services. Google Maps with its API can be advised a GIS provider.
Location Collection Service	This component performs location collection to get a latitude and longitude for a specific user. Accepting on the technology, this component may be accessed via the LBS Middleware (e.g. mobile network triangulation via a service provider) or directly (e.g., via GPS receiver in the Smartphone).

3.2. LBS Components

The basic components of LBS are service providers software application, a mobile network to transfer data and inquiry for service, a content provider to supply the end user with geo-specific information, a positioning component (GPS), and the end users cell phones(Seema Vanjire, Unmesh Kanchan, Ganesh Shitole,PradnyeshPatil,2014;AmitKushwaha,Vineet Kushwaha,2011).

Every LBS contain a number of components as well as maps and Geographic Information System (GIS) information, location collecting services, and LBS application-specific sub components. The architecture of LBS can be categorized as shown in Fig.2-

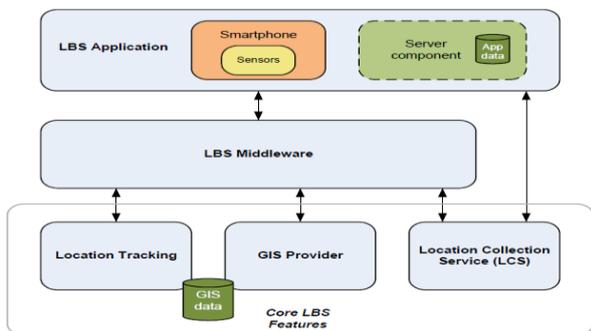


Fig.2 LBS Components (Seema Vanjire, Unmesh Kanchan, Ganesh Shitole, Pradnyesh Patil,2014; Amit Kushwaha, Vineet Kushwaha,2011)

3.3. Context

Location trace represents one important piece of context about a user. Location-based services are different from more conventional paper and internet based media (guides, directories, maps etc.) because they are aware of the context in which they are being used and can also adapt their contents and presentation accordingly.

Context is any information that can be used to characterize the situation of an physical entity. A physical entity is a person, place that is considered relevant to the interaction between a user and an application. Context awareness makes LBS applications very special compared to other technologies. Various researchers have attempted classify the different kinds of contexts that are applicable to a user when accessing an information service.

Context might filter information, for example by only retrieving cafe within 10/15 minutes walk of a user’s location, or they might present information in such a way that its relevance to a users context is enhanced, for example by using different map symbols for cafe that are currently open compared to those that are closed.

Adding this to other context such as current date and time and a person’s role in an organization could provide valuable information that LBS providers can use to make decisions or inferences about a user For example, based on the users current location, current time and calendar, a mobile digital dashboard application may bring up relevant graphs and statistics about a department in preparation for a meeting.

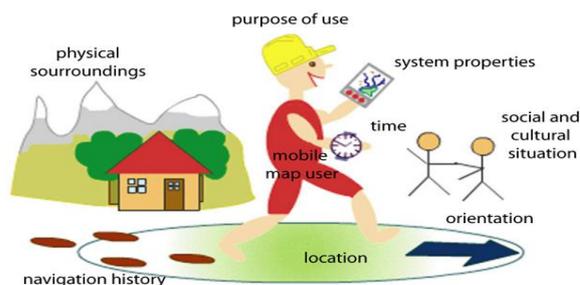


Fig.3 Different types of context after Nivala et al. (2003b) (Stefan Steiniger,Moritz Neun & Alistair Edwardes2,2010).

For example, Schilit1994 emphasize three important aspects of context: where you are (spatial context),

who you are with (social context), and what resources are nearby (information context). But Schilit (1994) adds that one has also to take into account technical aspects like communication bandwidth/quantity, network connectivity, speed of user and further the social situation or weather conditions (Stefan Steiniger, Moritz Neun & Alistair Edwardes, 2010).

Different Types of Context are as follows (Stefan Steiniger, Moritz Neun & Alistair Edwardes, 2010):

- **Mobile maps:** The recognition/identity of the user/person is very important to allow the service to look upon such issues as:
 - Their accurate age and gender, for example children are unlikely to be interested in knowing about bars and pubs.
 - Their own preferences, for example which language they want the service to be in.
 - Their friends and colleagues are, if they want wish to socialize and communicate.
- **Location:** The location is the most commonly considered element of context. It permits or let the information and services to be localized. A user's place can be absolute, for example a room inside a building.
- **Time:** Time can refer to the instantaneous time of day or longer intervals such as morning time, afternoon or evening time, day of the week, month, season of the year etc. for example a concert or a venue is open and their timing.
- **Orientation:** The orientation of the user is important to determine the direction a user is heading in and thus what is in front, behind and to either side of them. For example tourist guide this might be used to determine what historical building the user is facing.
- **Navigation history:** Navigational history allows the users to see where they have been and what they have seen and done. This can be useful in navigation to adjust a user while they're are moving and allow them to backtrack if they get lost. It can also help to build up a profile of the what the user is interested in.
- **Purpose of use:** The purpose of use is defined by the activities, goals, tasks and roles (e.g. a tourist) of users. Different types of usage require different types of information, types of appearance, for example maps, text or speech, and Modes of interaction.
- **Social and cultural situation:** The social situations of a user is characterized by their: closeness to others, social relationships and, collaborative tasks For example a user might want to 'follow the crowd' to find popular venues for example exhibitions, concert, or alternatively avoid others if they're are looking for wilderness areas, or they may just want to know where their friends are.
- **Physical Surroundings:** The physical surroundings includes such things as the lighting level or how much painful noise there is. For

example direct sunlight will make screens more difficult to read requiring the contrast to be adjusted.

- **System Properties:** This relates to the computer communications the user is occupying. What type of device they are using and what are its capabilities (e.g. touch screen, color or black and white etc.). If

They have access to a continuous internet connection. The bandwidth of the connection. The excellence of the positioning information, e.g. the GPS coverage or network.

3.4. Adaption

Systems which can modify their behavior because of context have been termed variously reactive, located, context-sensible and environment oriented (Abowd et al. 1999) (Stefan Steiniger, Moritz Neun & Alistair Edwardes, 2010).

- **Adaption to location and social context:** Persson et al. (2002) and Burrell et al. (2002) both searched at how location or place and social context could be used to help as a guide for new students on a university campus. Their systems adapted the information material according to place, time and social relationship between students and student groups. The material checked of effective or important notes left by students at locations anywhere in the university, which would pass on details, experiences and choices about what goes on where and when at that notebook's location (Stefan Steiniger, Moritz Neun & Alistair Edwardes, 2010).
- **Adaption to system context:** Chalmers et al. (2004) used the system context to adapt the communication and introduction level of information. They created a cat-and mouse game with many players where players could use extinct or non sensitive marks in the network and GPS coverage to cover from other players (Stefan Steiniger, Moritz Neun & Alistair Edwardes, 2010).

Adaption can take place at four levels (Reichenbacher 2003):

- **Information level:** The satisfied information is adapted. Examples incorporate filtering information nearer to a user or changing the level of detailed information according to tasks (Timpfet al. 2003).
- **Technology level:** Information is instructed to suit different device characteristics (e.g. display size and resolution, network and positioning). For ex. using auditory driving instructions for users with mobile phones or maps for users with PDAs.
- **User interface level:** This level is adapted. For example automatically criticizes and re-orientating a map as the user moves about.
- **Presentation level:** The visualization or determination of the information is adapted. For

example restaurants that are more according to a user's preferences in price and taste are shown with more crisp icons and those less relevant use more opaque ones (Stefan Steiniger, Moritz Neun & Alistair Edwardes, 2010).

3.5. Benefits of LBS

- Proactively pushing only relevant information to users to help speed up decisions and activities.
- Minimizing tedious data entry by integrating applications with advanced sensors such as accelerometers and cameras.
- Allowing service providers to model user behavior based on their location and route information, which can support improvements of service levels in near real-time and over the longer term.
- Inspiring sharing of location-based information, such as photos and reviews, generated by other service providers and users.

Conclusions

In this paper we basically studied the details of what Location based services actually are, their architecture and important for the today's generation. Location based services promise a very bright future considering all the key aspects of technologies required to operate the LBS available in the market. The recent year technologies identify LBS as predominant area of deployment of geographical data management. Further advances in visualization technologies are also expected, from basic improvements on how information is displayed on maps, to new augmented reality displays whereby location-based information is made visible alongside point of interests through a camera view. With improvements in processing power, it can be expected that these LBS's will be integrated with real-time image processing to improve the granularity of context information. In future LBS applications may extract air quality measurements from nearby environmental sensors and suggest to users to wear masks in high pollution areas.

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