

White Paper



Location Based Personalized Real-Time Recommendations on Mobile

Dr. Sujatha R Upadhyaya, Harikrishna Rai G N

Abstract

Undoubtedly mobile devices have brought multitude of changes to our lives. Most significant of them is the ability to communicate and disseminate information at real time. The footprints left behind by the mobile communications can be exploited to derive useful information that can in turn drive useful services at real time. Unlike most of the other services that operate on a 'near real' time frame, location based recommendation services on mobile can be achieved in true real time. This paper presents a mobile application that can host a fleet of real time recommendation services that can be designed for the typical mobile users.

Mobile Analytics - A Brief Overview

Mobile analytics refers to a clan of analytics applications that use mobile user and usage data. Mobile analytics applications provide important trends in mobile usage and help service providers and other business reach customers in a much systematic manner. But then, there's also a fear of the customer developing an aversion to the umpteen messages that he receives on a daily basis. From a customer's point of view, it would be good to receive recommendations from right vendor at the right time. However, personalizing these services according to the needs of the customer is a different ball game altogether.

Mobiles and especially the smartphones have changed the way we communicate, buy, and network. Our perception on entertainment and internet usage also has been changed considerably. As reported by ReportLinker, mobile applications market is expected to grow 25.0 billion by 2015 at a CAGR of 29.6%. Market research on location based services is very promising. According to Juniper Research, the recent developments in positioning technologies could drive revenues from mobile location-based services to more than \$12.7 billion by 2014. Gartner Report expects the total user base of location-based services to reach 1.4 billion by 2014.

This paper presents an analytics application on the mobile that delivers the right recommendation at the right time, personalized to one's need and contextualized to location of the device.

Why Location Based Real Time Recommendations?

It makes a lot of sense if personalized recommendations are provided through an application on the mobile and customer can look up just when he requires. Mobile devices on the move leave their mark on the towers, making it virtually possible to track the location of the device at any point of time. An ability to trace the location of the device is of great advantage in offering location based services, which when offered in real time triggers great value. This paper explores the scope of such recommendation solutions and discusses its technical feasibility.

Think of a scenario when one's on a stroll at his weekend hangout looking forward to buy some clothes. All that he needs to do is, access this smart application on his mobile and send a request. And there he goes, with all the information about the promotions that his most frequented shops around that area running at that point of time!

It is useful to find out how crowded the road ahead on one's way to work is. It would be equally interesting to receive notices about the events in and around the regular hangouts during the weekend. It would be extremely helpful to locate services such as hospitals, vehicle service stations etc in emergency situations. More so when the information is personalized and arrives right on one's handheld with little or no effort.

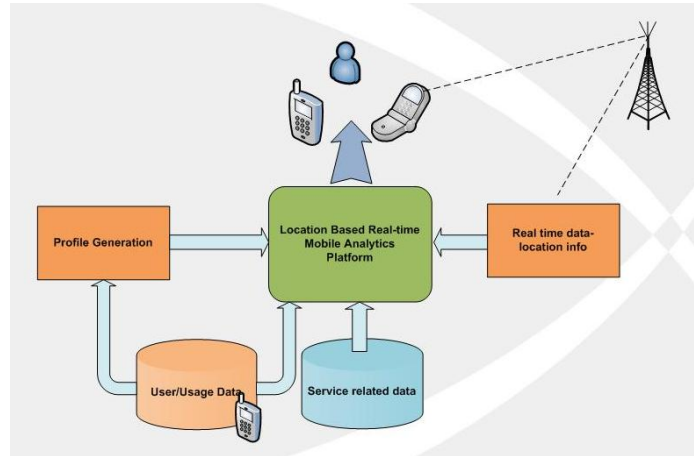
Location based personalized recommendations require an understanding of customer travel pattern, personal choices and location data. It would also require an access to service related data which helpful in understanding the current update. These services are all about providing the right kind service to the right person, right on time.

How does it Work?

The methodology of generating location based personalized real time recommendation involves building a profile for the user based on the usage data and user data. The usage data in this case refers to capturing device location data in the past to understand the travelling patters of the individual. (Unlike in most of the mobile analytics applications, data about the calls made, calling pattern, etc. are not taken into consideration.) Machine learning algorithms can be used effectively to identify the regular routes, weekend hangouts, most frequented routes and other travel pattern that can be used to build the user profile. The profile will also make use of user data such as the demographic and preferential information gathered during registration of the service. Profile can be further refined by considering the internet usage data to understand the preferences of user.

While profile information represents the behavioral and demographic information, the real time data provides the contextual information. If the service sought needs data specific to the service brought in and the recommendations are presented in the form of notifications, graphs or images.

The service can be provided through an application that runs on the device. However, information processing must be done at the application server and results must be communicated to the device. The user who has subscribed to this service, can access the information he's seeking through an application on his mobile. The focus is on the services that are based on the location of the device. The location provides an important context to service sought. The routes are identified as regular, frequented etc. for the person based on usage data. The user can opt to choose the kind of services that he needs when on regular / frequented / unfamiliar routes. The information received as a part of the service is personalized to the user needs and contextualized with respect to the location. Typical information received through the services is traffic updates, promotions or some emergency contact information.



Recommendation Services

For ease of understanding, we categorize the recommendation services as regular/most frequented, preferred/ frequented and unfamiliar routes.

Recommendation services for most frequented route: These recommendations work on the premise that the routes regularly used by the subscriber is identified by device tracking and duly endorsed upon by the user. The application is meant for delivering appropriate services that would be necessary while travelling on a regular route.

Traffic update is a good example of services on daily travel or regular routes. Real time information is gathered from the mobile densities reflected on the towers at different locations along the routes. The service is particularly useful on the way to work to avoid traffic congestions. While subscribers can use the application on the mobile to seek this service at any time of the day, automatic route recommendations that are generated by sensing the current traffic density can also be subscribed.

Recommendation services for preferred / frequented locations: Identification of the frequent routes can be done either by device tracking or by accepting suggestions from the subscriber.

Information about the promotions or campaigns around preferred locations is passed on to the user, when the device is tracked around that area. Alternatively, there's an option to seek such information through the application on the device. The service is used to check for the possible entertainment and shopping option in and around the location. Personalized recommendations for shopping options, movies and restaurants are typical examples personalized services. One can also seek general information such as ATM locations, gas station locations, and public transport schedules based on location.

Recommendation services for unfamiliar locations: When in an unfamiliar location, requirements of the subscriber would be quite different. Typical services ensure information about the choice of commute and travel schedule, places to stay, restaurants, tourist spots, ATMs, gas location etc., suited one's your personal preferences when out of station or in a unfamiliar place. Subscribers can also be benefitted from the ratings and reviews provided by the recent users.

An emergency in an unfamiliar location calls for different kind of services such as location and contact details of hospitals, accident service, towing service etc. Such information can be sought through an application on the mobile and the services are offered based on the device location taking also into consideration the personal preferences.

Translating to Benefits

Businesses strive to reach maximum number of people through their advertisements and promotional campaigns and mobile phones have been the natural choice of communication given to their simplicity of use. Being able to reach the most prospective customer and not end up annoying public is one of the most attractive benefits of location based real time recommendations. In addition, it also makes the personalized recommendations a protocol strictly adhered to. While reaching customers on mobile has become a common practice, the location based personalized real time recommendations can achieve much higher convergence rates. Analysis of the profiles of the subscribers can also help in determining the locations of high potential sales, which in turn suggest best locations for running campaigns, advertisements etc.

From the subscribers' point of view, these recommendation services bring in a different experience altogether. In one sense, it minimizes manual intervention, by automatically sensing and suggesting the most frequent / frequent / unfamiliar locations, businesses and services of interest. In the other sense, the services are much relevant and tailored to one's needs.

Key Takeaways

In the age of smartphones and applications, location based real time recommendations that are personalized to subscriber's needs help businesses reach target audience with high conversion rates.

The paper presents an application platform that uses the device tracking capability, locality context, user preference and demographic details along with service related data to come up with recommendations.

The solution provider needs to tie up with the service providers and businesses that are interested in the solution to gather and manage information.

Solution provider builds an application that senses user preferences through user and usage data, location context through the device location and deliver information personalized to subscriber's needs.

Subscriber can download the application, select services of his choice from the galore of services available. One can choose to get automatic recommendations or seek recommendations based on locality and need through the application.

A Glance at the Future

In the age of smartphones and applications, location based real time recommendations that are personalized to subscriber's needs help businesses. The near future holds a bundle of smart application that gain from location based and real time contexts.

Location based gaming (Gaming through mobile applications for large gathering like the one's at shopping malls) and social media connectivity with image/video assisted applications are seen as the future of location based real time applications on mobile. In the due course, the mobile footprints created by these applications can be analyzed to create definite insight into customer behavior and demand. Undoubtedly, location based real time analytics is the way to go!

References

1. <http://www.bigmarketingsmallbusiness.com/2011/02/17/small-business-mobile-marketing/>
2. <http://techcrunch.com/2010/02/23/location-based-services-revenue/#>
3. <http://www.reportlinker.com/p0258264/Global-Mobile-Application-Market.html>
4. <http://mashable.com/2010/08/05/mixpanel-android/#>
5. http://www.ehow.com/how_7561663_use-analytics-increase-customer-intelligence.html



Infosys among the world's top 50 most respected companies

Reputation Institute's Global Reputation Pulse 2009 ranked Infosys among the world's top 50 most respected companies.



About Infosys

Many of the world's most successful organizations rely on Infosys to deliver measurable business value. Infosys provides business consulting, technology, engineering and outsourcing services to help clients in over 30 countries build tomorrow's enterprise.

For more information about Infosys (NASDAQ:INFY), visit www.infosys.com.

Global presence

Americas

Brazil: Nova Lima **Canada:** Calgary, Toronto **Mexico:** Monterrey **United States:** Atlanta, Bellevue, Bentonville, Bridgewater, Charlotte, Fremont, Hartford, Houston, Lakeforest, Lisle, Minnesota, New York, Phoenix, Plano, Quincy, Reston, Southfield

Asia Pacific

Australia: Brisbane, Melbourne, Perth, Sydney **China:** Beijing, Dalian, Hangzhou, Shanghai **Hong Kong:** Central **India:** Bangalore, Bhubaneshwar, Chandigarh, Chennai, New Delhi, Gurgaon, Hyderabad, Jaipur, Mangalore, Mumbai, Mysore, Pune, Thiruvananthapuram **Japan:** Tokyo **Malaysia:** Kuala Lumpur **New Zealand:** Auckland, Christchurch, Wellington **Philippines:** Metro Manila **Singapore:** Singapore

Europe

Belgium: Brussels **Czech Republic:** Brno, Prague **Denmark:** Copenhagen **Finland:** Helsinki **France:** Paris, Toulouse **Germany:** Eschborn, Frankfurt, Stuttgart, Waldorf **Greece:** Maroussi **Ireland:** Dublin **Netherlands:** Amsterdam **Norway:** Oslo **Poland:** Lodz **Russia:** Moscow **Spain:** Madrid **Sweden:** Stockholm **Switzerland:** Basel, Geneva, Zurich **United Kingdom (UK):** London, Swindon

Middle East and Africa

Mauritius: Reunion **UAE:** Dubai, Sharjah

For more information, contact askus@infosys.com

www.infosys.com

© 2011 Infosys Limited, Bangalore, India. Infosys believes the information in this publication is accurate as of its publication date; such information is subject to change without notice. Infosys acknowledges the proprietary rights of the trademarks and product names of other companies mentioned in this document.