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Optimal Central Location Identification Through Geo-Coordinate Synchronization

Dr. Jayashri Shinde[1], Dr Mangesh Salunke[2], Dr. Priyanka Halle[3], Dr. Snehal Karad[4], Mrs Pranjali Deshmukh[5], Dr. Deepali Patil[6]

[1] Department of Computer Engineering ,MMIT, Lohgaon, Pune ,jayashri.shinde@mmit.edu.in
[2] Department of Computer Engineering ,MMIT,Lohgaon, Pune ,salunkemangesh019@gmail.com
[3] Department of IT ,SKN Institute of Technology & Science Lonawala, Pune ,hallepriyanka2011@gmail.com
[4] Department of Computer Engineering ,MMIT, Lohgaon Pune,snehalatafunde@gmail.com
[5] Department of Computer Engineering ,MMIT, Lohgaon Pune,deshmukhpranjali26@gmail.com.
[6] Dr D.Y.Patil School of Science and Technology, Dr.D.Y.Patil Vidyapeeth, Pune,deepalipatil86@gmail.com

Abstract: *In a recent report on location-based data, we analyze the opportunities emerging from this new local-mobile paradigm, examine how location-enabled mobile ads have generated excitement, look at how location-based feature have boosted engagement for apps, explain how local data can connect hundreds of thousands of small and medium-sized businesses to the mobile economy, and demystify some of the underlying technologies and privacy issues. Location-based features: have turned out to be great for boosting engagement on apps. Facebook, Google, Yelp, Instagram, Groupon, Twitter and dozens of other popular apps offer location-enabled features. These mobile properties, and many others, have moved beyond the "check-in" concept, which in any case never really caught on with users. They may still offer the ability to "check-in," but are also trying to be more imaginative with location-based notifications and location-aware services. By the means of implementing the proposed system we are trying to assist user rather user group in different way.*

INTRODUCTION

Location-based services (LBS) are a general class of computer program-level services that use location data to control features. As such LBS is an information service and has a number of uses in social networking today as an entertainment service, which is accessible with mobile devices through the mobile network and which uses information on the geographical position of the mobile device. This has become more and more important with the expansion of the smartphone and tablet markets as well.

LBS are used in a variety of contexts, such as health, indoor object search, entertainment, work, personal life, etc. LBS include services to identify a location of a person or object, such as discovering the nearest banking cash machine (a.k.a. ATM) or the whereabouts of a friend or employee. LBS include parcel tracking and vehicle tracking services. LBS can include mobile commerce when taking the form of coupons or advertising directed at customers based on their current location. They include personalized weather services and even location-based games. They are an example of telecommunication convergence.

This concept of location based systems is not compliant with the standardized concept of real-time locating systems (RTLS) and related local services, as noted in ISO/IEC 19762-5 and ISO/IEC 24730-1. While networked computing devices generally do very well to inform consumers of days old data, the computing devices themselves can also be tracked, even in real-time. LBS privacy issues arise in that context, and are documented below

Locating methods

Control plane locating

Sometimes referred to as positioning, with control plane locating the service provider gets the location based on the radio signal delay of the closest cell-phone towers (for phones without GPS features) which can be quite slow as it uses the 'voice control' channel. In the UK, networks do not use trilateration; LBS services use a single base station, with a "radius" of inaccuracy, to determine a phone's location. This technique was the basis of the E-911 mandate and is still used to locate cellphones as a safety measure. Newer phones and PDAs typically have an integrated A-GPS chip.

In order to provide a successful LBS technology the following factors must be met:

- Coordinates accuracy requirements that are determined by the relevant service;
- Lowest possible cost;
- Minimal impact on network and equipment.

Several categories of methods can be used to find the location of the subscriber.[R] The simple and standard solution is GPS-based LBS. Sony Ericsson's "NearMe" is one such example. It is used to maintain knowledge of the exact location, however can be expensive for the end-user, as they would have to invest in a GPS-equipped handset. GPS is based on the concept of trilateration, a basic geometric principle that allows finding one location if one knows its distance from other, already known locations.

GSM localization

GSM localization is the second option. Finding the location of a mobile device in relation to its cell site is another way to find out the location of an object or a person. It relies on various means of multilateration of the signal from cell sites serving a mobile phone. The geographical position of the device is found out through various techniques like time difference of arrival (TDOA) or Enhanced Observed Time Difference (E-OTD).

Self-reported positioning

A low cost alternative to using location technology to track the player, is to not track at all. This has been referred to as "self-reported positioning". It was used in the mixed reality game called Uncle Roy All Around You in 2003 and considered for use in the Augmented reality games in 2006. Instead of tracking technologies, players were given a map which they could pan around and subsequently mark their location upon. With the rise of location-based networking, this is more commonly known as a user "check-in".

Others

Another example is Near LBS (NLBS), in which local-range technologies such as Bluetooth, WLAN, infrared and/or RFID/Near Field Communication technologies are used to match devices to nearby services. This application allows a person to access information based on their surroundings; especially suitable for using inside closed premises, restricted/ regional areas.

Another alternative is an operator- and GPS-independent location service based on access into the deep level telecoms network (SSR7). This solution enables accurate and quick determination of geographical coordinates of mobile phone numbers by providing operator-independent location data and works also for handsets that are not GPS-enabled.

Many other Local Positioning Systems are available, especially for indoor use. GPS and GSM do not work very well indoors, so other techniques are used, including Co-Pilot Beacon for CDMA Networks, Bluetooth, UWB, RFID and Wi-Fi But which technique provides the best solution for a specific LBS problem? A general model for this problem has been constructed at the Radboud University of Nijmegen

PROPOSED SYSTEM

In recent years smart phone are become most important gadget for maintaining the daily activities and it also used by maximum population worldwide. Use of smart mapping technology is also increasing in large area like transportations, defense, sports, etc. Mapping applications are always depend upon current detection or preferred location of user or the group. Many application trying to get the user location to serve better service to location based services to user. Sharing location among group is better solution to know the individuals location. Finding or locating the location at known area or the known cities are usable and also feasible but at unknown location using these services may be risky or not feasible. Considering the condition any group wants to arrange a meeting at location which suits all the members hence it will always better to find centroid of the polygon generated by user geo-locations. It also has issue with finding better options of meeting while calculation. Proposed system aimed at finding the preferred and central location for user group using geo-point calculation and mapping technologies.

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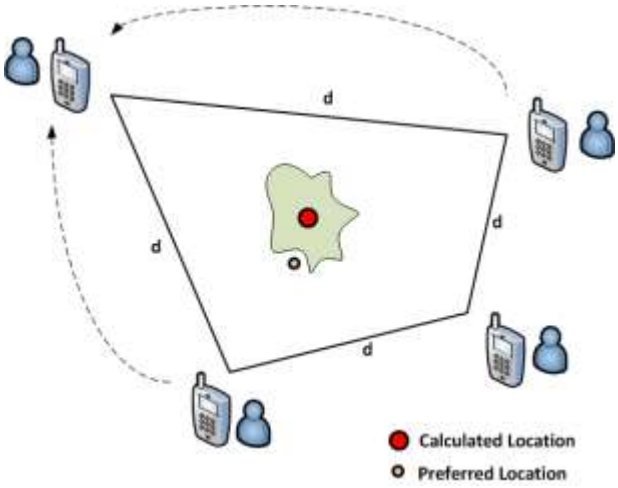

Figure 1.0 Proposed system process diagram

Figure 1.0 shows the overall working process of proposed system. This process includes multiple stages of execution. As per shown consider a condition there are five users in group planning to meet in centrally preferred location then one user from all will become master user and after which all user will share their location with master user and master user will execute the process. After execution system will calculate the central location by calculating the centroid of the polygon created by the user's connection. Once system get the central location it will ask user about his preferred location and after this using Google mapping API system will find out the nearest location selected by the user and once it found system will inform all user about final meeting location and if user wants he can view the travelling path to the location.

METHODOLOGY

Proposed system will employee following methodologies for successful completion of system

1. Finding the distance between multiple geo-points
2. Finding the centroid of virtually created geo-polygon
3. Finding the preferred location from mapping server
4. Stealth Geo-Synchronization

1. Great Circle Algorithm

The great-circle or orthodromic distance is the shortest distance between two points on the surface of a sphere, measured along the surface of the sphere (as opposed to a straight line through the sphere's interior). The distance between two points in Euclidean space is the length of a straight line between them, but on the sphere there are no straight lines. In non-Euclidean geometry, straight lines are replaced with geodesics. Geodesics on the sphere are the great circles (circles on the sphere whose centers coincide with the center of the sphere).

Through any two points on a sphere which are not directly opposite each other, there is a unique great circle. The two points separate the great circle into two arcs. The length of the shorter arc is the great-circle distance between the points. A great circle endowed with such a distance is the Riemannian circle.

Between two points which are directly opposite each other, called antipodal points, there are infinitely many great circles, but all great circle arcs between antipodal points have the same length, i.e. half the circumference of the circle, or πr, where r is the radius of the sphere.

The Earth is nearly spherical (see Earth radius) so great-circle distance formulas give the distance between points on the surface of the Earth (as the crow flies) correct to within 0.5% or so

2. Polygon Mid-Point Formulae

In geometry, the midpoint polygon of a polygon P is the polygon whose verrtices are the midpoints of the edges of P. It is sometimes called the Kasner polygon after Edward, who termed it the inscribed polygon "for brevity"

2.1 Triangle

The midpoint polygon of a triangle is called the medial triangle. It shares the same centroid and medians with triangle. The perimeter of the medial triangle equals the semiperimeter of the original triangle, and the area is one quarter of the area of the original triangle. Theorthocenter of the medial triangle coincides with the circumcenter of the original triangle.

2.2 Quadrilateral

The midpoint polygon of a quadrilateral is a parallelogram called its Varignon parallelogram. If the quadrilateral is simple, the area of the parallelogram is one half the area of the original quadrilateral. The perimeter of the parallelogram equals the sum of the diagonals of the original quadrilateral.

3. Google Map API

After the success of reverse-engineered mashups such as chicagocrime.org and housingmaps.com, Google launched the Google Maps API in June 2005 to allow developers to integrate Google Maps into their websites. It is a free service, and currently does not contain ads, but Google states in their terms of use that they reserve the right to display ads in the future.

By using the Google Maps API, it is possible to embed Google Maps site into an external website, on to which site specific data can be overlaid. Although initially only a JavaScriptAPI, the Maps API was expanded to include an API for Adobe Flash applications (but this has been deprecated), a service for retrieving static map images, and web services for performing geocoding, generating driving directions, and obtaining elevation profiles. Over 1,000,000[] web sites use the Google Maps API, making it the most heavily used web application development API.

The Google Maps API is free for commercial use, provided that the site on which it is being used is publicly accessible and does not charge for access, and is not generating more than 25 000 map accesses a day. Sites that do not meet these requirements can purchase the Google Maps API for Business.

The success of the Google Maps API has spawned a number of competing alternatives, including the Yahoo! Maps API, Bing Maps Platform, MapQuest Development Platform, and OpenLayers.

Expected Outcome & Future Scope

Once the system is ready with all the functionality it is expected from the system that system should,

- Calculate the central location with maximum accuracy.
- System should guide user if it is not able to find out the location in mx defined radius from central location
- System should guide user by showing route on map from user location to preferred location

In near future the system can be implemented over different mobile device and mobile platform and it can be developed as plug in for group chat applications like what's App and Hike messenger.

References

[1] Igor Bilogrevic, Murtuza Jadliwala, Vishal Joneja," Privacy-Preserving Optimal Meeting Location Determination on Mobile Devices", IEEE Transactions on Information Forensics and Security , Vol. 9, NO. 7,2014.
[2] Rinku Dewri and Ramakrishna Thurimella, "Exploiting Service Similarity in Location Based Search Queries, "IEEE Transaction on Parallel and Distributed, February 2014.
[3] Jing Liu, Zechao Li, Jinhui Tang, "Personalized Geo-Specific Tag Recommendation for Photos on Social Websites", IEEE Transaction on Multimedia, Vol. 16, NO. 3, April 2014.
[4] Linke Guo, Chi Zhang, "Privacy-Preserving Revocable Content Sharing in Geosocial Networks", IEEE Conference on Communication and Network Security,2013.
[5] Muhammad Ridhwan Ahmad Fuad and Micheal Drieberg, "Remote Vehicle Tracking System using GSM Modem and Google Map", IEEE Conference on Sustainable Utilization and Development in Engineering and Technology, 2013.
[6] Wei Li, Wei Jiao, Guangye Li, "A LOCATION PRIVACY PRESERVING ALGORITHM FOR MOBILE LBS", IEEE CCIS, 2012.
[7] Wei Xin, Cong Tang, Tao Yang,Hui Ping sun, Zhong Chen, "Towards-Privacy Preserving RFID-Based Location Based Services",IEEE International Conference on Fuzzy System and Knowledge Discovery, 2012.
[8] Jianliang Xu, Xueyan Tang, "Privacy-Conscious Location-Based Queries in Mobile Environments", IEEE Transactions on Parallel and Distributed Systems , VOL. 21, NO. 3, MARCH 2010
[9] Hanunah Othman, Habibah Hashim, Jamalul-lail Ab Manan, "Privacy Preservation in Location-Based Services (LBS) Through Trusted Computing Technology", IEEE International Conference on Communication, December 2009.
[10] Leone C. Monticone, Richard E. Snow, "Minimizing Great-Circle Distance Ratios of Undesired and Desired Signal Paths on a Spherical Earth", IEEE Transaction on vehicular technology, Vol. 58, NO. 9, November 2009.