

Smart Geofencing: An Inventive Mobile Marketing Strategy

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Abstract— Geofencing is a location-based service that allows marketers to send messages to smart phone users who enter a predefined geographical area. Marketing through mobile has been taken to the upgraded level with a new technology called geofencing, which gives marketing companies the ability to publicize specifically to promising customers within a certain geographic radius. In geofencing, a combination of technologies are used to construct a virtual boundary around a trade location and it includes, GPS abbreviated as Global Positioning System is a satellite navigation system that provide location and time information. RFID abbreviated as Radio Frequency Identifiers is a Bluetooth technology that uses radio waves to connect each other.

In this paper, we attempt to solve the problem of not considering user's interests towards targeted products by introducing a novel end-to-end system for automated design of affinity based smart geofences.

Index Terms— Geo-fencing, Spatial Data mining

I. INTRODUCTION

Geofencing is a method of defining a virtual barrier on a real geographical location. Mobile marketing has been taken to the next level with geofence, which gives companies the ability to advertise specifically to potential customers within certain geographic radius. Geofencing constructs a virtual boundary around a business location using a combination of technologies including GPS & RFID. Geofencing area can be as small as 50 meters and as large as an entire city. Geofencing technology defines a virtual boundary around a real-world geographical area and by doing so, a radius of interest is established that can trigger an action in a geo-enabled phone or other portable electronic device. Geofencing helps you in keeping control of your business by notifying you when a potential consumer is passing by your store, by a competitor's, or entering into a predefined area.

Location tracking is the precursor to geofencing and everything that has anything to do with geo-specific marketing. To get it working, you need to use a mapping product like Google map to map out the regions you want to geofence. This region can be in a circular or polygon shape in most cases. Once your desired region is mapped out for geofencing, you can then target your consumers via their mobile phones GPS. Then you can monitor your geofence through the day for potential prospects or customers who might be interested in your offer. It keeps to track them until that to go out. Geo-fencing is a location-based service that allows marketers to send messages to smart phone users who enter a predefined geographical area. This helps them to target the foot traffic in the vicinity of a point-of-interest. Marketing messages can be personalized to each user segment and can be auto-triggered on entry/exit from a geo-fence. A geo-fence is a virtual perimeter for a real-world geographic area.

This paper is mainly focused on the marketing based Service with geofencing. This project aims to assist marketers in creating smarter geofences. Many business use geofencing to simply send special offers to customers when they walk or drive near a business's location. But there's plenty of opportunity for creativity beyond that. The possibilities are broad. If you're creative, geofencing can serve as a phenomenal sales and customer retention tool. Geo-fencing allow an administrator to set up triggers so when a device enters (or exits) the boundaries defined by the administrator, an alert is issued. Many geo-fencing applications incorporate Google Earth, allowing administrators to define boundaries on top of a satellite view of a specific geographical area.

II. EXISTING SYSTEM

Modern day mobile devices can provide a lot of contextual information of a user like current location, physical state, temperature, humidity, etc. that can aid a multitude of use cases. In the industry, location based marketing has become increasingly important due to the expanding mobile user base. In this form of marketing, a brand targets its mobile app users with an offer for a product/service, based on their

geographical location. Geo-fencing is a location based marketing technique that allows brand marketers to push offers through in-app messages, location based coupons, real-time updates, etc. in specific geographical areas called geo-fences. Geofencing consists of two broad stages. The first stage is geo-fence design which comprises of a selection of key locations within an area of interest and definition of virtual boundaries (known as geo-fences) enclosing these locations. The second stage is real-time detection which is about geo-fence deployment and testing for the presence of mobile devices inside the deployed set of geo-fences in real-time[1]. The real-time detection problem has seen active interest from the research community, but the geo-fence design problem has not been addressed in depth. We only focus on the geo-fence design problem in this paper. For location based marketing, the geo-fence design stage requires a lot of manual effort on the marketer's end, since he/she has to understand the usage patterns and user preferences in the area of interest by analyzing aggregated data. Thus, the marketer runs the risk of detecting only global patterns while missing out on individual and segment level preference patterns.

A geofence service comprises one or several geographic areas, so called geofences which are associated with actions to be performed, corresponding conditions and related metadata. Our approach defines a formalism of geofence services and their interfaces. Providers can benefit from simple service creation with almost no programming experience and even without the need to provide own infrastructure, because the services are executed mainly on the mobile device and are deployed on the marketplace. From a user's perspective, the concept provides ease of use e.g. finding services in their local surroundings and running several services in one single application, which leads to scale effects through combined processing of position and context. Therefore, we developed a concept for a marketplace providing geofence services that can be implemented by everyone, thus helping to increase the overall usage and integration of proactive location-based services in our daily lives[2].

The influence of micro blog on information transmission is becoming more and more obvious. It analyzes the behavior of releasing messages in the Micro Blog community and presents a human dynamic model co-driven by interest and social identity. According to the empirical analysis and simulation results, the messaging interval distribution follows a power law, which is mainly influenced by the degree of users' interests. Meanwhile, social identity plays a significant role regarding the change of interests and may slow down the decline of the latter[3]. A positive correlation between social identity and numbers of comments or forwarding of messages is illustrated. Besides, the analysis of data for each 24 h reveals obvious differences between micro-blogging and website visits, email, instant communication, and the use of mobile phones, reflecting how people use small amounts of time via mobile Internet technology. We design a recommender system for the post purchase stage, i.e., after a user purchases a product. Our method combines both

behavioral and content aspects of recommendations. We first find the most related categories for the active product in the post-purchase stage. Among these related categories, products with high behavioral relevance and content relevance are recommended to the user. In addition, our algorithm considers the temporal factor, i.e., the purchase time of the active product and the recommendation time. We focus on designing the recommender system for the latter stage, denoted as "post-purchase" stage that starts directly after a user purchases some product. The design of such recommender system poses three important challenges: a) relevance of recommendation b) recommendation coverage, and c) time sensitivity [4].

Geofences have number of advantages, for example when you use them all of the geolocation work gets done by your end users phone, meaning that you don't need any hardware. That makes deployment in much easier proposition since it can usually be handled on the back end. Not only that, geofencing can also give you access to the rich analytics you need to ensure the success of your mobile marketing efforts.

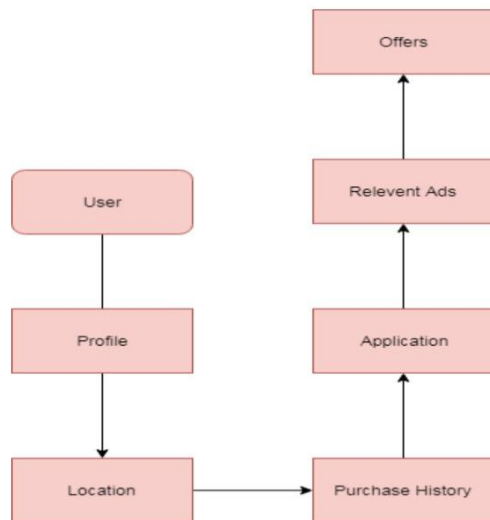
III. PROPOSED SYSTEM

Geo-fencing is a feature in software application/program that uses the global positioning system (GPS) or radio frequency Identification (RFID) to define geo-graphical boundaries. Geofence apps monitor When mobile devices or other physical objects enter or exit an established geofenced area, and provide alerts or notifications. Geofencing executed on the mobile devices. It includes the continuous positioning of the mobile device as well as the continuous matching of mobiles position with a set of geofences.

This paper is mainly focused on the marketing based Service with geofencing. This project aims to assist marketers in creating smarter geofences. Nowadays it has become one of the popular location based mobile marketing strategy. Geofence constructs a virtual boundary around a business location using a combination of technologies. while geofencing has actually been around for a while, the popularity of smart phones and mobile devices.

A. SYSTEM DESIGN ARCHITECTURE

The geo-fences can be specific to a product or service and is parameterized by a threshold to balance between effectiveness and unwanted targeting. geo coding and reverse geo coding is used to convert location in to latitude ,longitude and vice versa



For example when you are near to the favourite outlets, Geofencing works with Wi-fi, GPS, cellular data, geomagnetic and Bluetooth beacons. Here we use GPS and we require an app to do this. Location permission – In order to receive position updates, the application needs to have a permission for utilizing the user's location. Geofencing does not require to build anything physical in the real world it all happens digitally, which identifies points-of-interest and then suggests creation of geo-fences customized to each user segment

a. Office holder module

In this you can create a dealer account in order to prevent fake offers. Office holder access the dealer account by providing security like user name and password. OTP verifications are also performed for purchaser.

b. Dealer's module

Addition and modification of store offers performed in this module, which is responsible for the dealers to edit the login details.

c. Mapping

In this module user's current location is accessed. When user obtains any notifications along with the target outlets location. It also displays the offers and discounts of multiple outlets of near by the stay point.

d. Message audit

In message analysis we go for template matching

e. Purchaser

Once we installed this app in our smart phones you can get the capability to enter your mobile number and verifying the OTP.

f. Notification

The app always runs in the background and you will get notification when you entered in to a particular geo fence area.

In this paper the payments process done through payment gateway- razorpay. This is mainly used for the simplicity to handle online transactions. And the different payment modes that can be accessed by the purchaser are UPI, credit card, debit card, net banking, valet. User experience in Android are required to do payments. The main advantage of this is, when we use ordinary method it takes more time to complete the payment procedure. Here we do not require any other browsers, and perform payment within our APP itself. Refund options are also supported or provided in our Application.

Office holder can handle one website called *offeralert.tk* to upload offers of his store. At a time he can upload unlimited offers. *PHP myadmin* database is required to store the data that are uploaded by the admin/office holder on to *offeralert.tk*.

SOLUTION METHODOLOGY

The proposed system is implemented using the following steps.

A. Set geofence point

This can be achieved by using the following general geofence location tracking algorithm[5].

Input : r geofence radius

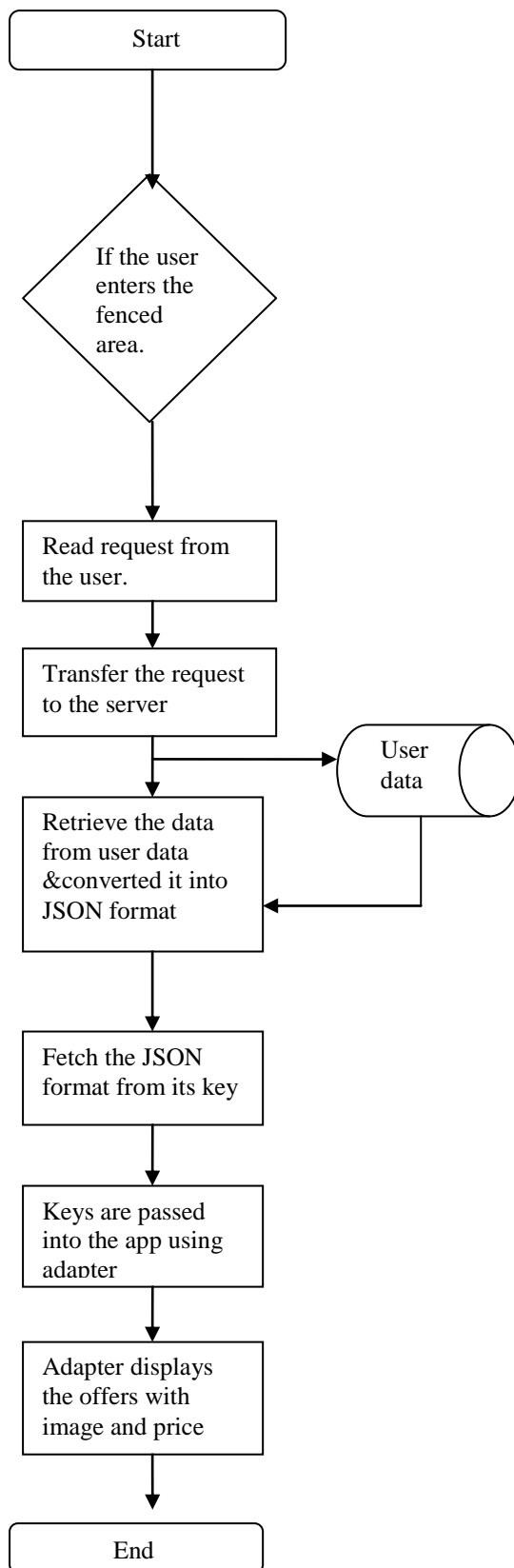
$g = [g_o, g_i]$

g_i is the position of interest, g_o is the position of user.

Output : true if r does not violate g, otherwise false

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1: if point in geofence(gi, r) then
2:   return true
3: end if
4: for all go(i) in go do
5:   if point in geofence(r, go(i)) then
6:     return false
7:   end if
8: end for
9: return true
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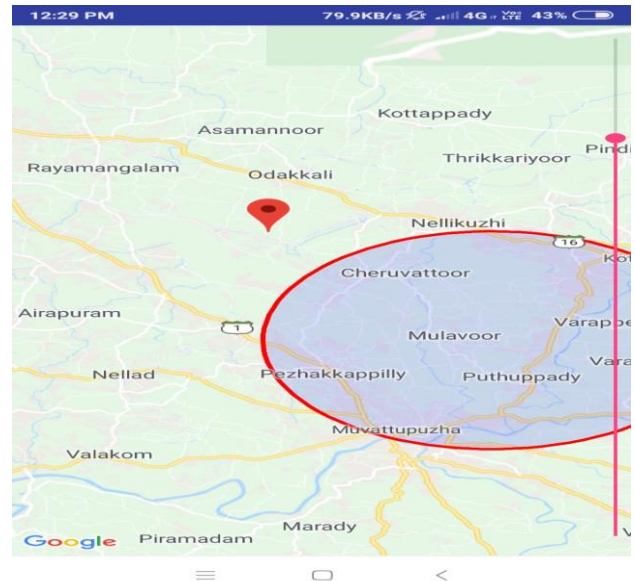
B. Based on the user point of interest ,which is implemented by using the following steps.



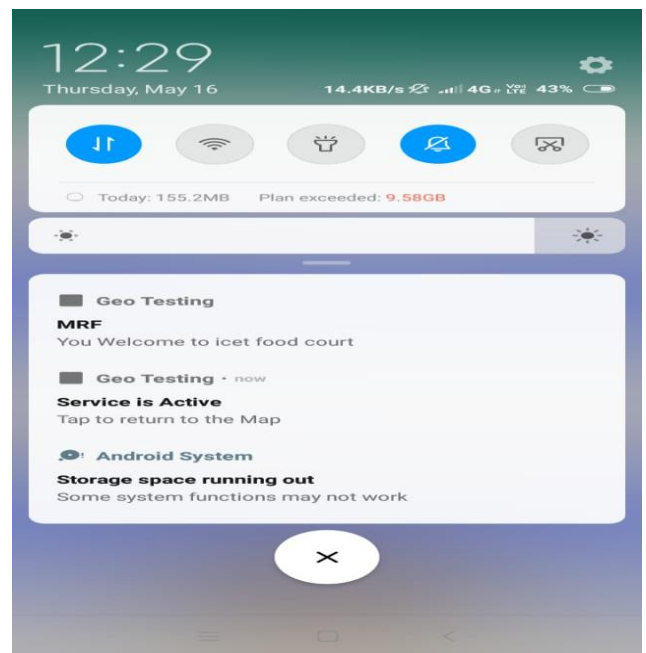
IV.RESULTS AND DISCUSSIONS

The user perspective of this geofence application is displayed in this chapter. Each steps are depicted for making sense.

1.When you are near to a favourite store geofence works with GPS WiFi .At the time of application running process user gives runtime permission. Latitude and longitude of the current user is identified and then check whether it matches with the latitude and longitude of the stores location.



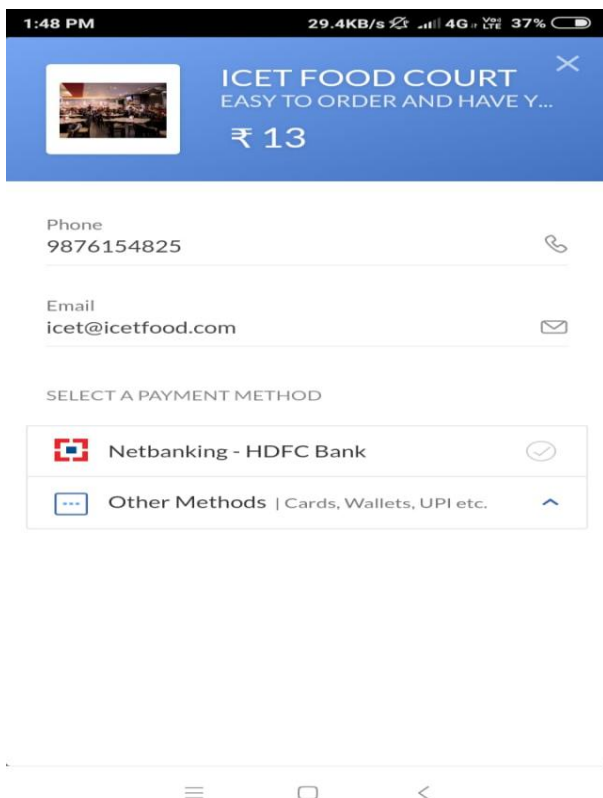
2. Inorder to obtain location of the current user you have to register our app in google map API console. User will get notification when they are roaming to their favorite outlets.



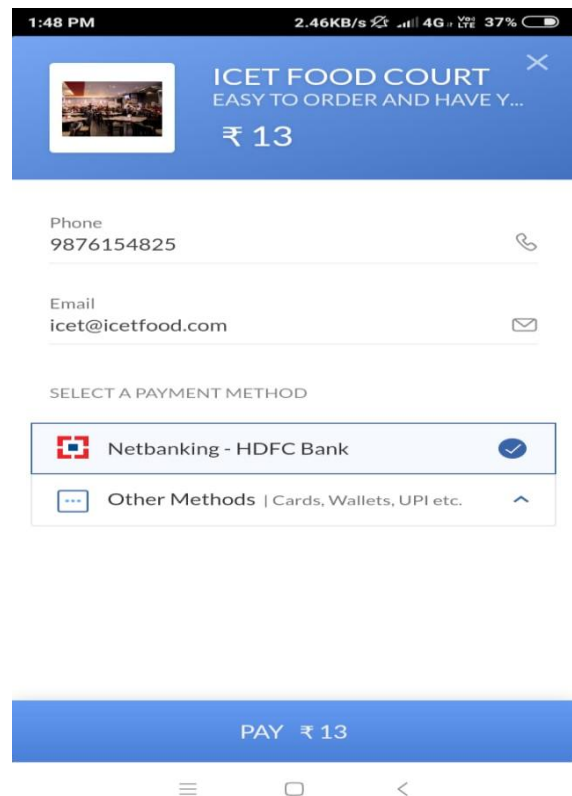
3. If the user is interested to purchase items, offers will load automatically into their smart phones based on their purchasing history.



4. User gives the relevant data such as phone number & email id to uniquely identify them.



5. This app also provides online payment facilities if you are interested to purchase an item.



6. If transaction done successfully, user will get notification.



V. CONCLUSION & FUTURE WORK

This paper proposes a new method for combining user information with location aware technology. The outcome of this innovative application which delivers relevant notifications and suggestions are what people expects from smart digital devices in this modernistic world. It's clear that geofencing is a powerful tool, but perhaps one of the biggest beneficiaries is online marketing.

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