Social Birds: Location Based Privacy Preserving Application

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ABSTRACT: With the advance in technology and social media, getting in touch with people and sharing our whereabouts is not a herculean task anymore. Just a few clicks on our smart phones and the information is online. But with this sharing of information comes the breach in privacy. It so happens that one wants to share his/her location with their close friends while at the same time tell their other friends that they are just having a good time. This different levels of privacy is not achievable with the existing social media. With this project it is possible to achieve such levels of privacy. Apart from this it also helps in finding out which of our friends in proximity of our location thus making it easy to contact them in times of emergency..

KEYWORDS: distance calculation, location privacy, privacy breach, search nearby, shortest distance, social networking

I. INTRODUCTION

The increasing use of smart phones has completely changed the way we used to communicate with the society. With new and upgraded smart phones we get an inbuilt GPS module which has powerful capability to track the location of the Smartphone holder. Location based services(LBS) make use of the GPS technology to provide various location based facilities to the users, for example Google maps, which provides users with routes to various places. Also, in an attempt to make communications easy and entertaining, the technology today has come up with interesting applications with the help of social network services (SNS). With help of SNS, users can post updates about their activities, share their thoughts with friends, family and followers. With the combination of LBS and SNS, every update that is posted online by the user through the Smartphone, is embedded with the location information of the user. This update is then shared with the friends of the user on the social media unless the user has kept some kind of privacy setting to not share them.

The use of both SNS and LBS is exploited by the social media applications. They provide so many location related features but using those features puts the location privacy of the user at risk as location isn't the only information that is accessed by these features and can lead to leakage of information. Consider an example where two friends a and b are out at a certain cafe in the city and decide to upload to picture of them on the social media. Looking at the picture, their friends might conclude that they are possibly in a relationship. This according to a and b might be a privacy breach in their private life. Thus, a privacy preserving application is required which provides prevention against such privacy leakages resulted by the combined use of lbs and SNS.

The simplest way, which most of the mobile applications (e.g., circle, who's around and foursquare) adopt, are that they only ask users whether they want to disclose the information or not. In the previous example of the two friends a and b, a might want to tell her close friends, the day and the exact location of her date with b, while on the other hand, she might just want to tell her colleagues that she is having a good time at the cafe, without letting them know that she is with someone. Thus, more privacy options other than just view or hide are needed show protect our privacy and at the same time be active on social media without having to worry about information leakage.

II. RELATED WORK

There Are Several Studies In Location Privacy Services. In [8], The Authors Compendious Lbs Alike Privacy Issues Into Two Important Category Which Is Location Privacy And Communication Privacy Which Based On

Objective As Identity Of The User And Whereabouts. Numerous Location Privacy Preservation Mechanisms (Lppms) [9], Has Been Proposed. In [10] Lppms Are Formalized Into Four Primary Methods: Hiding Events, Adding Dummy, Obfuscation And Anonymization But This Uses K- Anonymity Mode. Obfuscation [11], Includes Perturbation [12] And Cloaking [13] ,Is Quite Famous Method That Also We Can Use For Securing Both Location Privacy As Well As Anonymity.

Privacy Metrics Are Also Important Analyse the Performance Of The Lppms And Several Metrics Such As K-Anonymity And Also Entropy-Based Have Been Purposed. As Work Done In [14] However Pointed Out Such As Metrics May Not Able To Aboveboard Report The Status Of Location Privacy , And This Leads To Introduced The Concept Of The L-Diversity. By Analysing The Antagonist Knowledge And Attainable Attacks [15], Even Distortion Based Metric Is Purposed.

As Anonymity Of Location Discover Has Been Thorley Studied, Location Privacy Of Continuous Updated Location May Attracts More Attention [16]. Meantime More Advanced Techniques Are Developed And Open The Chance For Development Of More Powerful Adversaries.

III. PROPOSED ALGORITHM

A. *Design Considerations:*

- News Feeds: This module consists of two parts Message Feeds and Photo Feeds where all the messages/photos from our friends for which we have been authorized to access, are visible. Message Feeds shows text messages that our friends have sent while Photo feeds shows the image updates.
- My Feeds: All the messages and photos that the user has ever sent to anyone within his contacts is visible here along with the timestamp and all the privacy settings that were set for that particular post
- Profile: Every user has his own profile which includes his general information like his profile picture, user-name, email id, current status as well as the last known location which shows the location where the user was present most recently. The user can specify which of his friends will be able to view this location information. Options for changing password and profile picture and updating the status are also present.
- Contacts: User can search anyone who is registered with this application and view their profile information where the option to add them into different category such as close friends, college friends, family, colleagues is available. All the friends who are already categorized can also be viewed by selecting their respective categories.
- Update Image/ Create Message: The user can upload images as well as send updates about their activities with emoticons. While updating, the user can specify the privacy settings as per his wish. These settings consist of which level of location information the user wants to show and to whom. Location privacy has three options namely (a)Exact Location which show the exact information of his location, (b)General Location which gives in general location information like the name of the area or the district, (c)No Location which shows no information about the whereabouts of the user. Also, the user can choose whom to send this update from the list of categories namely Close Friends, Family, Colleagues, College Friends, others or anyone who is within a certain location range
- Search People Near Me: This module helps the user to search his friends who are within a proximity to his own location. The default distance within which friends from the contact list are searched is 5 Km.

B. *Description of the Proposed Algorithm:*

For an ease of understanding, consider the following attributes the user currently using the   application:

i.   Email represented as my_email
ii.   Latitude and Longitude represented as my_lat and my_long respectively.
iii. Geographical distance represented as dist

1. Distance Calculation

The use of Haversine Formula is been made to calculate the shortest distance between two points on the surface of the earth given the Latitude and Longitude of those two points.

i.   Accept the Latitude and Longitude of the two points that is lat1, long1, lat1, long2
ii.   Initialize a variable R such that,
            R=6371
        Where 6371 is the radius of the Earth in Km.
iii. Find the difference between the latitudes and longitudes respectively and convert the difference of latitude and longitude from degrees to radians.

        Dlat = (lat2-lat1) * (3.1415/180)
        Dlong = (long2-long1) * (3.1415/180)

   iv. Calculate the distance according to the Haversine formula

   $a = \sin^2(Dlat/2) + \cos((lat1) * (3.1415/180)) * \cos((lat2) * (3.1415/180)) * \sin^2(Dlong/2)$

   $c = 2 * atan2(sqrt(a), sqrt(1-a))$

   $d = R * c$

        Where d represents the shortest distance in Km between the two points.

2. Finding Friends Near Me
i.   Accept dist from the user within which he wants to find his friends
ii.   Fetch the emails of all users from the database and check that while the
            (user_email)!=(my_email)
        go to step iii. Else go to step vi
iii.   Check if the user_email that is fetched is related to the current user. If related, go to step iv else go to step vi
iv.   Fetch the latitude and longitude of the user and calculate the shortest distance d.
v.   If
            $d <= dist,$
        Display the name of user else go to step vi.
vi.   End.

IV. SIMULATION RESULTS

Figure 4.1 shows the very first screen of the application which is the Login In page. It asks the user to enter his email address and password for accessing the application. New users are required to register with the application using the option of Register. In case the user forgets his password, he can easily recover it using the Forgot Password option
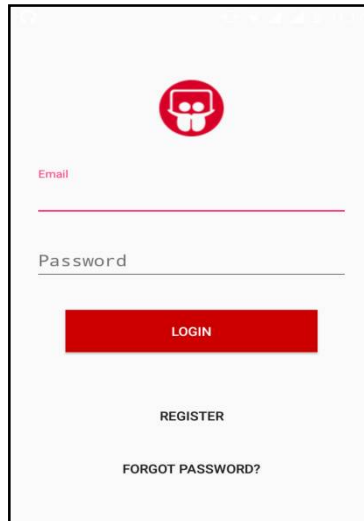
Figure 4.1

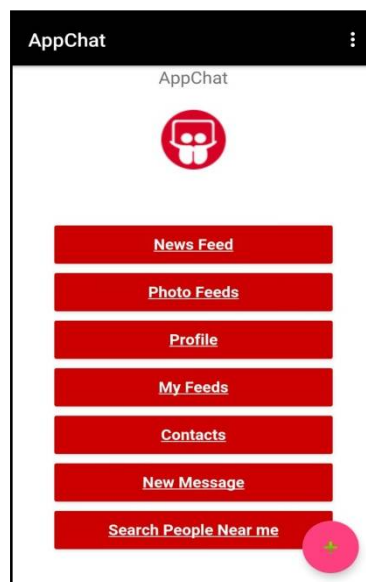. This feature ensures Security of the application and prevents unwanted access.

Figure 4.2

Figure 4.2 depicts the menu bar of the application, which consist of different tabs viz. News Feeds, Photo Feeds, Profile, My Feeds, Contacts, New Message, Search People Near Me. Select each option will lead to that respective page from this window. Each and every page in the application will be having this bar at the top, thus making it easy for the user to access any of these options easily without having to go all the way back to the Home Page.
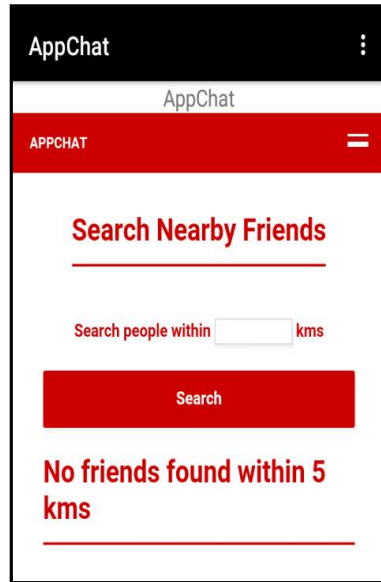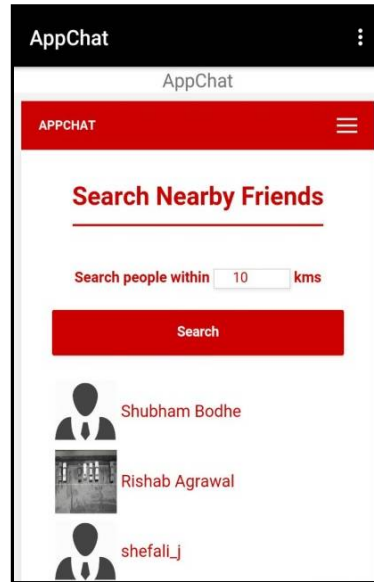
figure 4.3

figure 4.4

Figure 4.3 and Figure 4.4 show the Search Near By Friends option which asks for distance in km within which the user wishes to find his friends. If the distance is not specified by the user then it will take 5 Km as the default distance. If anyone of the user's friends is present within the specified distance, the user can send message to them and also can get to know the location of those friends depending on the location visibility settings set by the user's friends
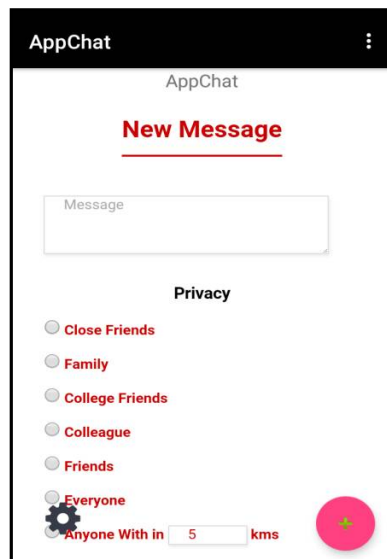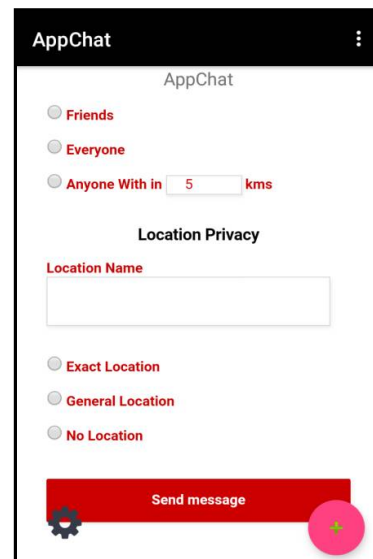

Figure 4.5

Figure 4.6

Figure 4.5 and Figure 4.6 show the message sending option of the application. It provides a text box to enter the message and provides options for Message Privacy as to who will be able to view the message, and Location Privacy that is, at what level of privacy does the user wants to show his location information which is either Exact Location, General Location or No location at all.

V. CONCLUSION AND FUTURE WORK

This paper has presented a social networking application with advanced location privacy preserving by users choices. It also allows the user to find other users' exact location. Also, while communicating, the users can show their location if they wish to. In cases of emergency, or otherwise, finding friends nearby is made easy using the option of Search nearby friends. Options for uploading photos messages and status is available to the users. Thus, with the help of this application, the privacy of location information of the user is maintained while communicating without the fear of privacy breach. In future, desktop application or website can be developed for this application.

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