Location based Crowdsourcing Application

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Abstract:- **Local questions come up all the time but they hard answer. Technological advancements have offered platforms to people where they can get answers to their queries but there aren't many solutions that encompasses the problem of getting answers to local questions. Our research proposes a solution that is practical, reliable and durable- an android application with a simple question and answer format using location based crowdsourcing. Location based crowdsourcing requires the presence of a crowdworker at a specific location. Location based task could be accessed by crowdworker only via smartphone and only if the participant is at specific location. This way only those people can answer the user's question that are in close space proximity to the user. Users can connect with their neighbours safely. The application allows minimal interaction with other users. Users can only ask and answer questions that are asked by their neighbours whilst their personal information is kept private. The effectiveness of the application is especially in urban and suburban areas where there is a high population density.**

Keywords: Crowdsourcing, Neighborhood, Proximity, Engagement.

1. INTRODUCTION

The online collaboration of a group of people to solve a problem is known as crowdsourcing . Wikipedia defines crowdsourcing as "the process of obtaining services, ideas or content by soliciting contributions from a large group of people and especially from an online community, rather than from traditional employees or suppliers"[1]. The user generated content and knowledge from a large number of people creates the foundation of Web 2.0. Companies apply the idea of the wisdom of the crowds [2] and collective intelligence to areas such as decision support, open innovation, social collaboration, and the so called crowdsourcing [3]. Howe coined the term "crowdsouricng" in 2005 [4], refers to the outsourcing of traditional company tasks to the crowd, an indefinitely large and heterogeneous group of individuals. With the large crowd at its expense companies are offered fast, flexible and relatively cost-efficient access to a large knowledge pool. Crowdsourcing no longer refers to ''a function once performed by employees.'' In fact, crowd- sourcing can include functions that never were considered by firms, let alone performed by employees. Crowdsourcing also no longer refers to an ''undefined (and generally large) network of people.'' Crowdsourcing now accomodate a highly defined network of people and the crowdsourcing campaigns are generally highly focused. Crowdsourcing now combines both human and non human factors. It is not restricted to only people [5].
With the assistance of smartphones, crowdsourcing offers several new possibilities for the performance of crowdsourcing tasks. With the help of internet functionality and the integration of various sensors like motion sensors and GPS receivers, smartphones allow the users to generate and share content on the go, thus enabling fast and simple information exchange [6,7]. Location based crowdsourcing requires the presence of a crowdworker at a specific location, because a certain activity (e.g., the collection of location dependent information) can only be conducted on-site [8].

Using the location based crowdsourcing concept, we designed an android application that will allow users within close proximity to help each other out with their day to day problems. HoodXplore enables users to ask questions and submit answers. HoodXplore allows users to get their neighborhood-related questions answered on an open chat forum. The app tracks the user's GPS location to connect them to their neighbourhood after sign-up. In the HoodXplore app, when users ask a question, it's routed to relevant neighbourhood experts who can help. Local questions come up all the time but they are hard to answer. HoodXplore helps in finding answers to these questions from local experts. Application allows users to keep up with the community. HoodXplore allows users to ask and answer question without sharing their personal information. User's profile contains only a profile picture and Name. The application has a leaderboard. Leaderboards help increase a player's level of engagement with a game by motivating them to achieve a higher rank and climb the leaderboard. They improve retention by motivating players who are slipping down the ranks to re-assert their position at the top [9].

2. RELATED WORK

There are researches that investigated various features of crowdsourcing systems. Mike Qu and Yu Sun[10] proposed an IOT-Based crowdsourcing system for object tracking and information sharing. They developed a proximity sensor device powered by other users in the area using crowdsourcing, by using their mobile devices as receiving stations of the service, extensively increasing the effectiveness of this service in especially urban and suburban areas where there is a high population density. Their system provided solutions to issues such as the growing number of runaway children, wandering Alzheimer's patients and lost pets in the society. Their system overcame the shortcomings of GPS location, which often requires expensive infrastructure. They developed a low-cost, reliable, and crowd-based technology using individuals mobile devices as receiving stations to map and locate lost items used in accordance the iBeacon technology. The

iBeacon technology is able to emit Bluetooth 4.0 signals and is based on physical proximity sensor devices known as beacons. That particular technology requires no pairing, which means that mobile devices, such as cell phones and hardware devices could all receive the signal and prompt a specific function, from retrieving the satellite location of that device to sending a statement or message to that device. A number of such mobile devices in the same area, simultaneously sensing a beacon, could provide a well-positioned and accurate satellite location for that purpose.

Furthermore, Carolin Durst and Michael Grottke[11] explored a research model explaining how the task location and incentives affect the task take up and time to start for the tasks that are processed. For their analysis they used the system-generated data of location based tasks available in Berlin. Using the location concept they investigated the effects of task location, monetary and non-monetary incentives on participation. They analyzed how the indentified parameter influence the take up probability of the task and time to start the task, which refers to the time elapsed between the moment the task is issued on the crowdsourcing platform and the moment any crowdworker starts processing. They concluded that while the population density of the task location does not influence the probability that some crowdworker will eventually process the task, a task located in more densely populated area tends to be taken up more quickly. The results also indicated that the take up probablility increased as the monetary and non-monetary incentives are raised. However, increasing the monetary incentives and lowering the non-monetary incentives shortened the time to start.

Currently there are many websites available that are based on the concept of crowdsourcing. iStackPhoto is a web based company offering huge collections of images uploaded and sold by photographers. Clients seeking stock images purchase credits and start buying the stock images they want. Amazon's Mechanical Turk is a web based marketplace for works requiring human intelligence in which anybody can post their tasks and specify prices for completing them.

3. PROCEDURE

3.1 Google Authentication

Authentication is the process of identifying an individual, usually based on a username and password before they can access certain resources in our case mobile application resources like data and other information (Authentication is simply the SignIn Process for Apps). The application make use of firebase's Google authentication to one click sign in option to the user. Google Sign-In is a secure authentication system that reduces the burden of login for your users, by enabling them to sign in with their Google Account—the same account they already use with Gmail, Play, Google+, and other Google services [12]. Firebase Authentication makes building secure authentication easy, providing sign-in and on-boarding for your users on all their devices.It provides backend services to securely authenticate users, paired with easy-to-use client SDKs. It can authenticate

users using passwords and federated identity provider credentials.Firebase Authentication also provides UI libraries to implement a full authentication experience in your app.

3.2 Implemented Four Fragments

A Fragment represents a behavior or a portion of user interface in a FragmentActivity. You can combine multiple fragments in a single activity to build a multi-pane UI and reuse a fragment in multiple activities. You can think of a fragment as a modular section of an activity, which has its own lifecycle, receives its own input events, and which you can add or remove while the activity is running (sort of like a "sub activity" that you can reuse in different activities).

A fragment must always be hosted in an activity and the fragment's lifecycle is directly affected by the host activity's lifecycle. For example, when the activity is paused, so are all fragments in it, and when the activity is destroyed, so are all fragments. However, while an activity is running (it is in the *resumed* lifecycle state), you can manipulate each fragment independently, such as add or remove them. When you perform such a fragment transaction, you can also add it to a back stack that's managed by the activity—each back stack entry in the activity is a record of the fragment transaction that occurred. The back stack allows the user to reverse a fragment transaction (navigate backwards), by pressing the *Back* button.

3.2.1 Home Fragment

Home fragment consists of recycler views to display questions based on location to users. Inside recycler view questions are displayed within respective card views. Initially all Data is retrieved from firebase database and stored in an Array List. When the location of user changes then the data is filtered based on current location and stored in another array list and is displayed on the screen.

3.2.2 Question Fragment

Question Fragment consists of edit text area for user to ask questions. It also displays user's display picture and current location using locations services of android. User enters the question in edit text area and presses the ask button. When the ask button is clicked then the data is sent to firebase database and stored. Data stored in database consists of location name, latitude, longitude, display picture Uri, question, username.

3.2.3 Profile Fragment

Profile fragment displays user's profile picture, username and email address. Data is retrieved from user's Google account with the help of firebase authentication services. The fragment also consists of logout button to log user out of application.

3.2.4 Leaderboard

Leaderboard fragment consists of a leaderboard to showcase top users on basis of most question asked. Data is retrieved from firebase database. The reason the application

consists of a leader board is to keep users' motivated and keep engaging.

3.3 Firebase realtime database

Store and sync data with our NoSQL cloud database. Data is synced across all clients in realtime, and remains available when your app goes offline. The Firebase Realtime Database is a cloud-hosted database. Data is stored as JSON and synchronized in realtime to every connected client. When you build cross-platform apps with our iOS, Android, and JavaScript SDKs, all of your clients share one Realtime Database instance and automatically receive updates with the newest data. Instead of typical HTTP requests, the Firebase Realtime Database uses data synchronization—every time data changes, any connected device receives that update within milliseconds. Provide collaborative and immersive experiences without thinking about networking code [13].

Table 1. Database

| Name	Picture	Question	QuestionId	Location	Latitude	Longitude	Uid
AashishAgarwal	https://lh3.googleusercontent.com/-ESagnQjsK80/AAAAAAAAAAI/AAAAAAAAFBU/20T1hnesw5c/s96-c/photo.jpg	Medical stores near A block?	-L_rfcgBCOKF1beEC4Zt	Dilshad Garden	28.6820608	77.315089	112268271118809793182

3.4 Location Services

Android gives your applications access to the location services supported by the device through classes in the android.location package. The central component of the location framework is the LocationManager system service, which provides APIs to determine location and bearing of the underlying device (if available). As with other system services, you do not instantiate a LocationManager directly. Rather, you request an instance from the system by calling getSystemService(Context.LOCATION_SERVICE). The method returns a handle to a new LocationManager instance. Once your application has a LocationManager, your application is able to do three things: Query for the list of all LocationProvider instances to determine the last known user location.Register/unregister for periodic updates of the user's current location from a location provider (specified either by criteria or name).Register/unregister for a given Intent to be fired if the device comes within a given proximity (specified by radius in meters) of a given lat/long [14].

3.5 Mobile Application

Mobile applications are made available on Android platforms to further improve the effectiveness and coverage of the system. The application revolve around four major activities: One Home activity, one question activity, one profile activity and one leaderboard activity. A sign in activity is also created which uses Google authentication. For privacy concerns, applications only accesses users' name, email address and display picture from users' Google account. Android devices need to have version 6.1 and above for application to work.
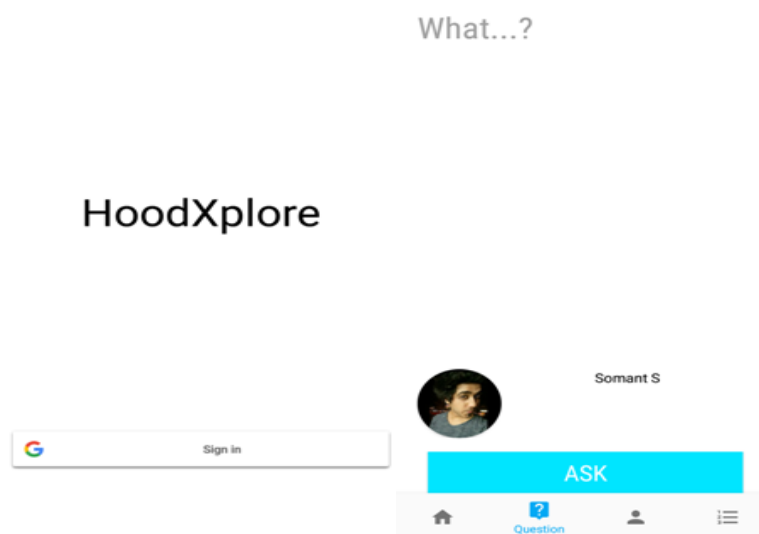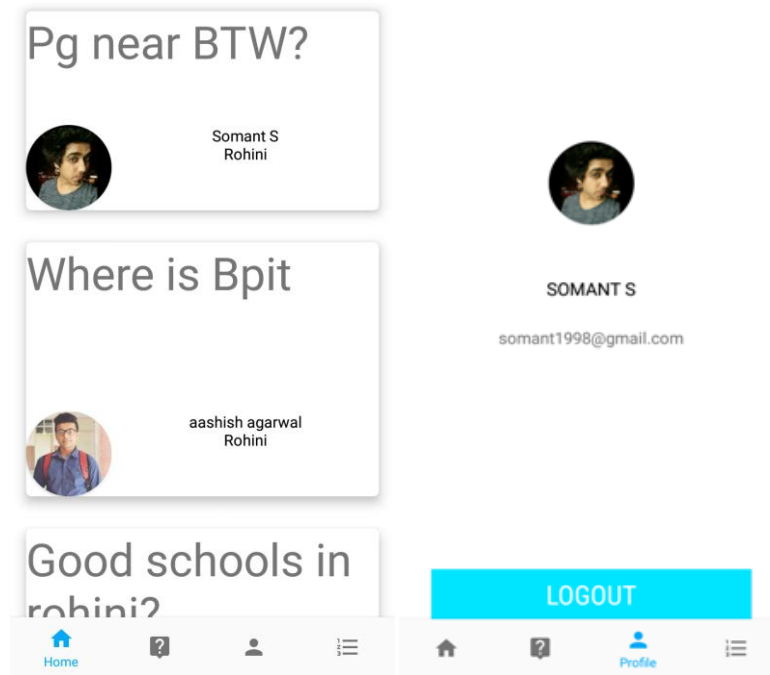
Figure 1. The Screenshots of Mobile Application

4. RESULT & FUTURE SCOPE

In this project, we proposed the application to solve the problem where small answers that are local to area remains unanswered. The probability of these questions to get answered increases as the application users are given access to only those questions that are local to area. Your neighbours and colleagues know what's around you the best. HoodXploreis a local social network that aims to answer questions people often have about their immediate surroundings, such as where to find the best street food or a reliable car repair shop.

As for the future work, we will investigate the accuracy and efficiency of the system. The application currently take input only as text. In future a feature to take input through voice can be added as well. Currently user can post question only for their local area, in future user will also be able to post questions to different area from their local area as well. In future app can also be used as advertising platform for local stores, where local stores can post advertisements that will be available to local people.

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