A survey of mobile social networking

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Abstract

When the rapid evolution of mobile devices, the massive adoption of cell phones by the population and the important growth in social networks came together, the mobile social network was born.

This paper goes through the migration of social networks to mobile devices and the new features that they could provide with the context awareness abilities.

Also, it covers some architectural notes for the mobile social networks and their limitations. In addition this paper studies some current mobile social networks as Facebook, Dodgeball, Socialight and WhosThat.

KEYWORDS:mobile social networks, Facebook, Dodgeball, Socialight, WhozThat, context awareness

1 Introduction

The definition of *social network sites* (here in after called social network) based on [2] firstly is a web-based service that allows individuals to construct a public or semi-public profile within the system, secondly it manage a list of other users with whom they share a connection, and thirdly is possible to view and traverse their list of connections.

A social network provides a variety of mechanisms for users to share data with other users. Also, it has the ability to search for users with similar interests and to establish and maintain communication between them [1]. Online social networks have become very popular during in these last few years. For example, Facebook had more than 150 million users in February 2009 [4].

The origins of social networks lie in the early 1990's when they were simple means of communication between people over the Internet, such as forums, discussion groups, professional associations or other places where people could exchange ideas. Internet technologies evolved together with social software. In this evolution, the social networks as we know them were created; people started to have a profile, and in turn started sharing content in a more active way in the Internet communities.

According to the definition that it was provided at the beginning, the first social network site was launched in 1997, namely SixDegrees.com [2].

Social networks are part of the Web 2.0 evolving process of the Internet. Web 2.0 was born in a conference brainstorming session between O'Reilly and MediaLive International. They noted that the web was more important than ever and there were a lot of new applications and sites appearing every day. The central concept behind Web 2.0 was the power of collective intelligence: sharing data [7].

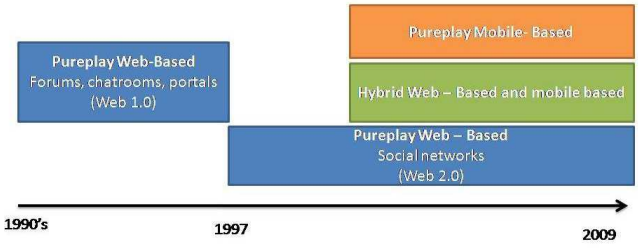

Figure 1: Evolution of social networks. Based on [9]

One of the main reasons for this evolution into Web 2.0, was that people start participating more actively in the Internet [7]. This occurred because the technology started to allow the Internet users to add content to it. Before Web 2.0, few users shared content in the Internet and most of the Internet users were typically receivers of that information.

The technology continued evolving and with it the social software. Nowadays cell phones or other mobile devices are something that most of the people have. And mostly all new cell phones have the ability to navigate through the Internet.

Mobile 2.0 is the name given to the transfer of all the current trends of Web 2.0 to mobile devices [5]. And *mobile social networking* refers to transferring the current trends in social networking to those mobile devices, adding new features that the mobility and the context awareness provide.

Nowadays, there are more cell phone users than Internet users. Also, the cell phone is a personal device that goes wherever owner goes. As a result it can provide a lot of information about the environment of the user. For example, where he is, what music he is listening to, which photos he is taking, etc.

Currently most of the approaches to mobile social networking are extending the user interface, so they are able to work in a mobile device. But the fundamental change is to extend the software, using all the information that the mobile device provides. These features give a lot of detail of the content that the users share in the social networks. For example, a user can upload a photo and the system automatically places the photo in a map [5].

The aim of this paper is to give an introduction to mobile social networks, the features that they share with ordinary desktop based social networking and their differences. In addition the paper further examines some architectural notes, concepts on privacy and security and some case studies of mobile social networks that have been created.

Figure 2: Mobile context. Based on [5]

2 Relevant features of the mobile social networking

In general mobile social networks are different from the desktop based social networks, because they have some additional features such as, contextual information.

As shown in Figure 2, the mobile context can be generated by means of information such as the location of the mobile device, the time, tags that describe the environment, information from other devices that surround it, some capabilities that the handset has and some preferences provided by the user.

2.1 Positioning

Positioning means knowing the user exactly location. The positioning feature is one of the main differences between a desktop device and a mobile device. In contrast to the former, the cell phone can inform where the user is and this information can be used for enriching the information of the user.

For example, [5] suggest that is possible to make a list of the most visited locations or favorite places. This information can be gathered from the environment of the cell phone. The most visited locations can be for example the coffee shop that the user always visits in the mornings, the school or work the user goes, or the pubs that he goes to on weekends.

Another example is the automatic localization of photos. Thus, a user takes a photo with his cell phone, and automatically the cell phone situates the photo on the map where it was taken.

By knowing the exact location of the user, the mobile social network can provide a lot of interesting features.

2.2 Friend locator

Friend locator is another interesting feature that [5] mentions in his paper is the *find a friend* feature. Also, a similar approach is described in [1] and [6]. The idea behind all the articles is to be able to find someone that is in the same place that the user is. Imagine this situation for instance; if a user is in a bar, he is connected to a mobile social network by means of mobile technologies such as Bluetooth, through which he can browse information of all the people in the bar that are also connected to the same social network. As a result he can if he wants send them a message or check someone's profile.

This feature is potentially very attractive, because the idea of being able to know everybody who is in the same place is really tempting for the users.

2.3 Capture and tag media

Capture and tag media is a feature is presented in [5]. The idea behind this feature is to use contextual information to provide pre-defined / commonly used tags based on location and proximity to other users or places.

For example, someone takes a picture of one friend in front of the Big Ben. Both friends have mobile network software, so when one takes this picture, the cell phone automatically tags the friend in the picture and locates it in the map [5].

2.4 Update personal status

The main concept behind update personal status feature is that personal status can be updated automatically, with contextual information [5]. For example: where the user is, what music he is listening to, the state of the mobile device (for instance, in a meeting state), etc. This data all combined provide a lot of information that allows the mobile network software automatically updates the status of the user [5].

2.5 Interact asynchronously

The asynchronous interaction involves other features of the cell phone, like the ability to send a SMS or an email. This feature allows the user to send other kinds of messages to the people connected to the network [5].

2.6 Advertising

Mobile devices have an enormous advertisement potential. Besides being extremely popular, most people carry them all the time, enabling personalized advertising [3] .

There are some reasons why mobile advertisement is an important branch in the mobile business. Firstly, the high penetration rate of mobile terminals. Secondly, mobile terminals are personal communication devices and are individually addressable. Lastly they have multimedia capabilities and provide interactivity.

Despite the many advantages of mobile devices, however there are some serious challenges regarding mobile advertising, such as spam, limited user interface, privacy concerns and the cost of mobile communication [3] .

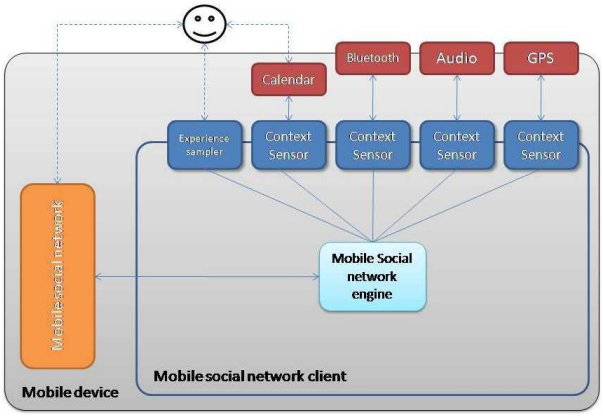

Figure 3: Example of possible architecture. Based on [5]

3 Some architectural notes for the mobile social networks

The architecture design behind a mobile social network client with all the functionality mentioned in the last chapter is not as trivial as having only a web browser. A component that is able to manage all the contextual data is needed.

Detailed in Figure 3 is one possible design of architecture for the mobile device social network client. There are some components as Bluetooth, audio, GPS, etc that are part of the mobile device and are in contact with the user environment, but also there are other applications, such as the calendar, that are inside the mobile device but the user interacts with them. These components provide information of the context to the mobile social network engine: for example, where the user is, which activities the user has planned for a particular day. All that information is gathered and processed by the mobile social network engine that is in the mobile device. This engine can be used to determine the importance of certain contextual information. The data that was processed by the engine will be input for the mobile social network [5].

3.1 Hybrid or purely mobile

There are two possibilities for mobile social networks. One is a purely mobile social network will be those that were designed from the first moment to be used in mobile devices. The other is a hybrid one is one that first was designed to work in a web-based platform and then their features migrated to the mobile platforms [8].

3.2 Client software or mobile WWW

Another important characteristic of a mobile social network is the way it was designed. There are two different approaches, namely web-based and software in the client, and the result obtained can be very different.

If there is some software installed in the mobile device, mobile social network will be able to obtain more contextual information from the mobile device than will the social networks that just are web-based. But this approach also consumes more resources and the client has to be developed for a lot of different mobile platforms.

3.3 Limitations

Nowadays there are some limitations on mobile devices and platforms. Because not all mobile devices permit good context awareness sensors and sharing media is also limited. But in the near future most of the cell phones will have a camera, GPS and other devices and applications that will provide a context awareness input to the mobile social networking.

Another important limitation of the mobile devices is the usage of resources, such as bandwidth, processing time, memory and power. These resources are more limited in the mobile environment than in the desktop one. So it is important to design an architecture with the purpose of which is to enable the efficient use of these resources.

4 Privacy and security

Privacy and security are two important concepts in social networking. Everything must be done with the consensus of the users, which information should be public and which private. In mobile social networking privacy and security are key components of the application. Because contextual information can uncover real time data of the user, this can create data that the users might think that is intrusive or incorrect. For example user location is something that should be displayed with a lot of privacy, i.e., not for everyone to view [5].

5 Case studies

The next chapter describes some examples of mobile networks. There are two gropus, the social mobile networks available in the market and the ones that are part of a research project. From the first group this paper examines Dodgeball and Facebook and from the second group Socialight and WhosThat?

5.1 Socialight

Socialight (http://socialight.com/) is a prototype of a mobile social network that is based mainly on the concept of presence awareness. This network has three main features: friend locator, tap and tickle, and sticky shadow.

Friend locator is a tracking feature in which the Socialight server tracks the user's current location and the location of other users within their social network. One of the core functionalities is to let the users know when they are close to a friend.

Tap and tickle is a Socialight feature that allows the user to communicate gesturally with another user by controlling the length of the cell phone vibration.

Stick Shadow are location- based messages that are left in a geographical place for specific friends. These messages expire after some time and are only available in that area. When the intended recipient enters the zone of the message it appears in his cell phone [6].

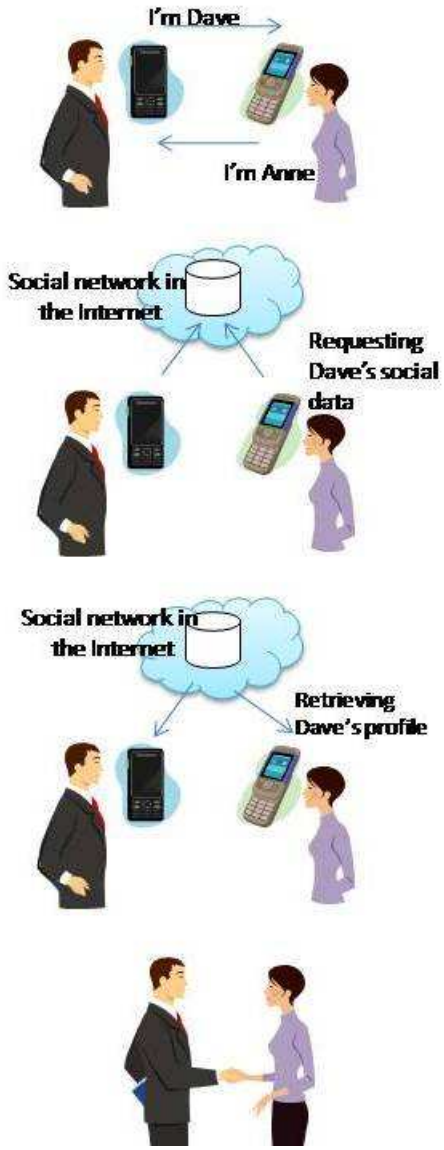

Figure 4: How WhozThat works. Based on [1]

5.2 WhozThat?

WhosThat (http://whosthat.com/) is a research project that tries to create a seamless social interaction through a mobile social networking technology. It tries to achieve this by implementing a basic two step protocol. The first step consists on sharing the WhosThat identities between any two nearby cell phones. The second step consists on consulting the online social network with the received identity to import the relevant information of the person nearby to enrich the human interaction between both users.

The identity sharing can be done with Bluetooth or WiFi or through Internet. Both cell phones must have the WhosThat identity sharing protocol, in which each cell phone periodically advertises an identifier of the owner of the mobile device. This is a pointer to the social networking profile stored on a remote site. This procedure is explained in Figure 4 [1].

One good feature about WhosThat is that the social networks that are requesting the profiles can be any social network, such as Facebook, MySpace, Orkut, etc.. This two step protocol can handle a full range of social networks. Another good thing is that it is very extensible software, for example one or more applications can be integrated into the basic information sharing mechanism. In their article [1] propose an example in which a context aware application is integrated with this protocol. This example is a context aware music jukebox. This music box can retrieve all the profiles of the people close to it and ask the social networks for the musical preferences of these individuals. With that data then it plays the users favorite music [1].

5.3 Dodgeball

Dodgeball (http://www.dodgeball.com/) is a service that merges location service with social networks and is available in 22 cities in the United States. The company was acquired by Google in 2005.

Dodgeball is a mix of social networks, cell phone messages and mapping software. First Dodgeball allow creating a public profile and having friends. Also knowing the friends of friends and having a list of "crushes" . With a simple text message you can inform all your friends that are 10 blocks away from you that you are at some place. Also if you send that message to all your friends, Dodgeball will send you a message if one friend of your friends is in a 10 block radius. Also if some of your "crushes" is in a radius of 10 blocks of your location Dodgeball will let you know. Dodgeball also have location features, if you are looking for some place, sending a message with the name of the place and Dodgeball will reply with the address [9].

So if the tool fulfills its purpose, at the end of the evening Dodgeball has facilitated encounters with friends, friends of friends or "crushes" . Dodgeball is very useful in dense urban environments where there are a lot of potential meeting points and a lot of people [8].

Dodgeball does not require installing any software in the client cell phone; users just have to send messages to the server. Also Dodgeball is not full context aware; it only knows the position of a user if he checks in with a message.

5.4 Mobile Facebook

Facebook (http://www.facebook.com) born as a fixed social network, with the years it went mobile. With Facebook mobile is possible to use Facebook social network on a cell phone. With Mobile Facebook is possible to upload photos and notes from the user camera straight to Facebook. Also receiving and replaying Facebook messages, pokes and wall posts (all features available also in the fixed social network) using text messages or the phone browser.

Facebook is extensible; this means that different providers can create applications that add more functionality to the original application. Mobile Facebook is also extensible. Users can add applications to their profile and these applications allow the user to do a lot of new things. There are a lot of new applications that can give context awareness as the *Friend GPS* application that allow users to update their GeoStatus and see their friends. Also is possible to browse

Facebook users sorted by distance from the user current location. [4].

There are a lot of Mobile Facebook applications that interact with the components of the cell pone as the calendar or the address book or the play list.

6 Conclusion

The rapid growth of mobile technology has generated a large number of mobile social networks in the last few years. There are a lot of advantages of having a mobile social network over having only web-based social networks. The value that the context awareness adds to the mobile social networks is very important. This also a big improvement in the services that the users can get, and also there is a good niche of business in the mobile advertisement. However, there are some important factors to take into account as the privacy and security of the users information and the correctness in the use of mobile social networks.

If we compare the mobile social networks that where analyzed in this paper, they all have different characteristics, ones need to have a software installed and this ones provide more interaction with the context of the user but other are WWW social networks, that can be used in most of the actual cell phones. WhosThat for example, needs to have software installed in the cell phone but the profile of the user can be retrieved from any social network. That is a great feature, because there is no need to have two profiles one for the desktop and one for the mobile environment. Mobile Facebook works also like that, but it does not have the ability to find users near by as WhosThat has. Dodgeball is a light weight mobile social network that does not need any software, and it work only with SMS, but it does not uses any of the cell phone context information. Socialight needs software installed and only works with in the Socialight network.

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