Friendlee: A Mobile Application for Your Social Life

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ABSTRACT

We have designed and implemented Friendlee, a mobile social networking application for close relationships. Friendlee analyzes the user's call and messaging activity to form an intimate network of the user's closest social contacts while providing ambient awareness of the user' social network in a compelling, yet non-intrusive manner.

Categories and Subject Descriptors

H.5.2 **[User Interfaces]**: User-centered design, **H.3.4 [Systems and Software]**: Current awareness systems, user profiles and alert services.

General Terms

Design, Human Factors.

Keywords

Intimate networks, mobile social networking, ambient awareness, and recommendations.

1. INTRODUCTION

The viral growth of online social networking applications in the past few years has facilitated, like never before, forming new friends online and keeping in touch with old friends and past colleagues. These sites typically make it easy to declare friends, or add like-minded people as friends, and then follow their activities or posts online. While these declared networks appear large and thriving, it has been recently shown [4] [10] that much of the activity in these networks is driven by a more intimate group of users. Twitter networks of friends and followers, for example, are sustained [4] by an underlying sparse network of friends who interact frequently and reciprocate each other's attention. Even in the social networks formed through mobile phone calls and text messages--these overlap substantially with a user's 'real' social network [8]--an analysis of phone communication logs [10] reveals that people interact with only a small fraction of the

people actually present in their phonebook.

These kinds of intimate social networks with the closest, most meaningful ties, such as between close friends, family, relatives and even close colleagues, are characterized by high frequency of interaction, but also by a great need to feel connected, to be in touch [14], and a need for sharing detailed activity and context information [11]. However, scarcely any of the online social networking applications[1] support users adequately in staying connected with this core group of people [15]. To address this problem, we have developed Friendlee, an application that analyzes the user's call and messaging activity to identify the user's closest social contacts. Friendlee enhances the mobile phone, providing the user with an ambient awareness of her intimate network.

Since Friendlee also keeps track of the businesses the user has called frequently, we are able to automatically identify the user's preferred services, which can then be used as recommendations to their social network. Close friends and colleagues remain among our most influential sources of practical advice and recommendations about services, such as health insurance and restaurants, as well as about people, in both social and professional settings [17]. Several studies [3] have shown that people find recommendations generated by their social networks in taste-related domains to be as useful and interesting as the ones generated through traditional collaborative filtering approaches.

In addition, like most social networking applications, Friendlee allows users to browse the connections (and preferred services) of people in their intimate network. People in close relationships are often already peripherally aware of each other's contacts: the high degree of clustering (forming cliques) in social networks makes it very likely that friends of friends are friends or at least partially know about each other [16].

In the following section, we examine the related work in applications supporting intimate ties and sharing of context information. This is used to deduce some design principles which we describe in Section 3, along with the basic design of the user interface of Friendlee. We describe our implementation of Friendlee in Section 4, following it up with a discussion of its implications in Section 5.

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[1] Even beyond social networking applications, there are no applications that support intimate networks, with a few notable exceptions, e.g. [15].

2. RELATED WORK

In this section, we briefly review the state of the art and the related work that has informed our design. We first review existing mobile social network applications (Section 2.1) and indicate how Friendlee differs from these. Although Friendlee has a number of different features, it is the sharing of context information that has received the most attention in related work. We review the literature on contextual cues in Section 2.2 and the associated privacy and sharing rules in Section 2.3.

2.1 Mobile Social Networking Applications

Several popular online social networking applications such as Facebook[2] and LinkedIn[3] have developed mobile versions that allow access to their social network via a mobile phone. Friendlee, by contrast, centers from the ground up on the mobile phone and the sub-social-network it mediates. Not only do we therefore access a potentially different social network, we are able to automatically construct a rich picture of the user's social life with minimal input from the user.

Several mobile social networking applications today are based on the mobile phone, including Mig33[4], Loopt[5] and Google Latitude[6]. However, none of these applications distinguish between the intimate social connections of users and their casual acquaintances. Even though they reside on the phone, none of them (as far as we know) utilizes this to provide phone status awareness or use the call and messaging history of the user to infer social closeness.

2.2 Ambient Social Awareness

Several systems have investigated the value of various kinds of awareness cues, such as location, status, etc., for constructing a picture of others' situation and status. Context-Phonebook [13] displayed location ('at work', 'at home' and 'on the move') and a simple red-green-yellow availability marker next to contacts in a mobile phonebook. These simple awareness cues were themselves found to be very useful for the majority of people. In fact, several studies [12][1] have noted that to friends or good acquaintances, even simple or incomplete awareness cues are imbibed with a lot of meaning, which they are able to interpret to make fairly accurate judgments about the other person's situation.

ContextContacts [12] and the Contacts application [7] both extend a smartphone's phonebook to explore several additional contextual cues, such as time spent in the current location, phone alarm profile (vibration on/off, ringer on/off), how many friends are close-by and whether the phone was handled recently (indicating that users were near the phone and presumably more available for communication). They found that people found the current location and time spent there to be the most useful cues. Andersen et al.'s system, iSocialize [1], also explored several awareness cues, such as activity, status, relation and vicinity, and found that most users were more interested in the cues that

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[2] www.facebook.com

[3] www.linkedin.com

[4] www.mig33.com

[5] www.loopt.com

[6] http://www.google.com/latitude/

changed recently than in the actual values of the cues. Our system, Friendlee, amalgamates most of the useful awareness indicators, such as current location and time spent there, local time and weather; a status message; and status indicators, such as available, busy, phone on hold, engaged, silent and vibrate. It also highlights cues that changed recently. Although the interface of Contacts is quite similar to Friendlee's interface, unlike Contacts, Friendlee is inherently a network application. Thus, Friendlee allows users to browse not just their own contacts, but also the connections of their contacts. In addition, Friendlee sorts the user's immediate contacts and contacts more than one hop away by the strength of the edges between them (which are in turn based on the frequency and duration of the interactions that the edges represent).

2.3 Sharing Rules For Context Information

One of the biggest concerns people have when sharing context information is that of privacy. Lederer et al. [9] found that people make judgments about whom to share information with based more on the identity of the recipient of the information than on the situation within the information was sought. Davis et al. [2] also found that people decide whom to share information with based on their relationship to the person, such as spouse, friend, peer etc. While each person made different decisions about which information to share with whom, casual acquaintances consistently received significantly less information than other kinds of relationships [2] [10]. We therefore expect people to share a significant amount of their context information with their intimate social network within Friendlee. In addition, Friendlee leverages the inferred closeness of the social ties to decide which information should be displayed by default to each contact.

Jones et al. [6] have gone further to show that people want to specify particular individuals, groups and basic categories, such as friends, families, colleagues, etc., who may or may not access their information. We have designed a category-based privacy model for context sharing in Friendlee. Our model allows users to specify which people or categories may view (a) different kinds of context information about them (i.e. location, phone status etc.) and (b) different categories of their connections (i.e. their friends, family, colleagues etc.). Also, we follow all the privacy design guidelines described in [5], except the one that states that personal data should not be handled by operators. This is necessary in Friendlee and makes possible many of its unique features.

It is important to mention here that Lugano et al.'s study [9] indicated that people may not be keen on sharing a mobile phonebook with others, since the information is considered too personal. However, their study did not consider how this feeling is affected by the nature of the relationship and, as mentioned before, people in close relationships are often already peripherally aware of each other's contacts [16].

3. DESIGN

In this section, we describe Friendlee's most relevant features and their implementation in the user interface.

Behavior-based intimate social network

Friendlee analyzes the user's call and messaging history to identify the people she is closest to, based on phone conversation frequency, recency and duration. Using these variables, the connections of a user are assigned a relative weight that determines the 'closeness' of that contact to the user with respect

to other contacts. The strongest connections (the ones with the largest weights) are displayed prominently, allowing the user to have instant access to them without wading through a large phonebook. By using phone conversations as an indicator of close social interaction, Friendlee trims the user's large casual social network into a core intimate one.

The contact list screen (shown in Fig. 1(a)) is the primary screen of Friendlee and displays the user's intimate social network in reverse order of relationship strength. In design, the screen is similar to a mobile phonebook or instant messaging contact list.

Ambient awareness of intimate social network

The user can easily share key aspects of her context, namely her location at different granularities (country, city or GPS-based street address), her status message and her phone status (on/off/available/ringer/silent/vibrate), local time and weather as well as who her other family, friends and colleagues are. Such ambient awareness of people's closest connections helps them feel emotionally close and also facilitates communication (e.g., knowing whether this is a good time to call). To protect privacy, people have access to this context-sharing functionality only for connections made by mutual consent.

From a small pilot survey of users, we found that the status message, availability and phone status were the most important awareness cues when deciding whether to call a contact. Accordingly, these are placed in the upper-left hand corner of the contact's information (see Fig. 1(a)), which in terms of visual design is the area with the greatest salience.

Browse connections of close contacts

A key differentiator of this application from existing ones is the ability to browse the connections of close friends. This allows users to reach out and be aware of their social network beyond their immediate relatives and friends. A significant proportion of these connections will already be known to the user; however, the user may not have any means to contact them herself. To safeguard privacy, users can always restrict visibility of chosen contacts to specific categories of people.

To make navigation through the social network as seamless as possible, a long click on any contact on the contact list screen takes the user to her contact's own contact list screen, with the contact listed on top.

Search and get recommendations for businesses from social network

Favored businesses also constitute part of a user's true daily social network, from the local take-out to the user's cable company. While browsing a friend's connections, people also see their preferred businesses, getting implicit recommendations about e.g. the dentist their friend likes to go to. In addition, Friendlee allows users to search their social network for people and businesses. Search results are ranked by social distance from the user.

Category-based privacy model for sharing context information with contacts

Friendlee allows users to classify their contacts into categories, such as 'Colleague' or 'Family', which helps the user both navigate quickly to a desired contact, as well as define privacy settings for various categories, e.g. sharing location information only with family. Categories are also used to define privacy settings for which of the user's contacts are visible, e.g. my colleagues may view my other colleagues, but not my family.

Lean and compelling interface designed to maintain real-life social contacts

Designed to maintain an intimate social network, Friendlee's interface is minimal, yet intuitive and natural to the kind of communication that takes place among close friends.

Most of the core functionality is supported by the contact list screen and profile screen (Figure 1(b)). The interface itself is mostly touch-based and with simple icons. From the contact list screen, the user can send a message to a contact by clicking on the contact or directly to a category of contacts. This feature is very useful for coordinating between friends or colleagues.

(a)   (b)

Figure 1: Friendlee's user interface, showing (a) the screen with the list of contacts and (b) a profile screen.

4. IMPLEMENTATION

Friendlee consists of three components: (1) a phone-based client that represents Friendlee's user interface and gathers user information, such as personal status, call and messaging history, (2) a Web-based interface where users can access and change the same information as on the client, and (3) a backend server that stores a centralized copy of all user information within a large database. The client synchronizes several times a minute with the server, providing it with up-to-date information about the user's call history and context, such as location, phone status, etc. The server propagates context information of users (including current local time and weather conditions) through the user's social network taking into account her privacy policies. The server is also responsible for calculating the strength of relationships in the social network based on communication history and thus the 'social distance' between any two people.

We have developed a prototype of Friendlee for the Android and Windows Mobile operating systems. In addition, we have developed a Web-based interface that users can access on a desktop. We plan to develop a simplified mobile Web browser so that restricted functionality is available on phones that support Web browsing. The server is implemented in Perl and uses a MySQL database for storage. The client-server connections are

currently 'stateful' (TCP/IP), but we could also support stateless connections using HTTP and SMS. In next steps, these prototypes will be used as part of a field study to assess the usability and usefulness of Friendlee's user interface and recommendation algorithms.

5. DISCUSSION AND FUTURE WORK

Although currently a standalone application, Friendlee could completely replace the default phone book to serve as a one-stop organizer for one's social life. Given that Friendlee handles so much personal data, it is of utmost importance that it has a transparent trust model, both towards the service provider and among the users. To this end, we have designed a simple, category-based permission system that allows users to fine tune the amount of personal information that contacts belonging to particular categories may see. While it is necessary for the server backend to keep a record of users' calls and their personal context information, appropriate (public key-based) encryption can be applied to minimize the risk of a privacy breach.

An interesting question for future research is whether call behavior can be analyzed to automatically categorize contacts based on the time when they are called, the duration and frequency of calls with them, and the places where users tend to call them, e.g. home vs. work. Another interesting question that arises concerns the amount of information access a person should have when they are more than one hop away from someone else's intimate network, i.e. what is a good privacy model for sharing information beyond one's immediate connections? This could be an all-or-nothing access or something more nuanced, possibly based on social distance to the user.

We also see unique opportunity in Friendlee's synthesis of the 'weighted' social network of users with a recommendation system. The intimate network of contacts is both a source of recommendations for businesses (and people), and a measure for the potential relevance or strength of the recommendation, using e.g. the network distance between the recommender and the recipient of the recommendation. While not all frequent interactions with a business are necessarily positive, it at least indicates that the contact has had significant experience with the business and can provide insights into the quality of its service.

We believe Friendlee could also be valuable beyond the consumer world and serve a useful role in businesses whose employees frequently work in the field, such as healthcare providers, telephone companies etc. In such settings, people frequently need to contact, coordinate and share their status with colleagues both at a centralized office, but also at e.g. other customer locations. For these people, easily determining the context and location of close colleagues is a business need rather than a social one.

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