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Secure Encounter - Based Mobile Social Networks: Requirements, Designs and Tradeoffs

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Abstract: Existing social networking services recommend friends to users based on their social graphs, which may not be the most appropriate to reflect a user's preferences on friend selection in real life. In this paper, we present Friendbook, a novel semantic-based friend recommendation system for social networks, which recommends friends to users based on their life styles instead of social graphs. By taking advantage of sensor-rich smartphones, Friendbook discovers life styles of users from user-centric sensor data, measures the similarity of life styles between users, and recommends friends to users if their life styles have high similarity. Inspired by text mining, we model a user's daily life as life documents, from which his/her life styles are extracted by using the Latent Dirichlet Allocation algorithm. We further propose a similarity metric to measure the similarity of life styles between users, and calculate users' impact in terms of life styles with a friend-matching graph. Upon receiving a request, Friendbook returns a list of people with highest recommendation scores to the query user. Finally, Friendbook integrates a feedback mechanism to further improve the recommendation accuracy. We have implemented Friendbook on the Android-based smartphones, and evaluated its performance on both small-scale experiments and large-scale simulations. The results show that the recommendations accurately reflect the preferences of users in choosing friends.

Keywords: Social networks, Location-based services, Privacy, Semantic-based.

I. INTRODUCTION

Twenty years ago, people typically made friends with others who live or work close to themselves, such as neighbours or colleagues. We call friends made through this traditional fashion as G-friends, which stands for geographical location-based friends because they are influenced by the geographical distances between each other. With the rapid advances in social networks, services such as Facebook, Twitter and Google+ have provided us revolutionary ways of making friends. According to Facebook statistics, a user has an average of 130 friends, perhaps larger than any other time in history In our everyday lives; we may have hundreds of activities, which form meaningful sequences that shape our lives. In this paper, we use the word activity to specifically refer to the actions taken in the order of seconds, such as "sitting", "walking", or "typing", while we use the phrase life style to refer to higher-level abstractions of daily lives, such as "office work" or "shopping". For instance, the "shopping" life style mostly consists of the "walking" activity, but may also contain the "standing" or the "sitting" activities. Our proposed solution is also motivated by the recent advances in smartphones, which have become more and more popular in people's lives. These smartphones (e.g., iPhone or Android-based smartphones) are equipped with a rich set of embedded sensors, such as GPS, accelerometer, microphone, gyroscope, and camera. Thus, a smartphone is no longer simply a communication device, but also a powerful and environmental reality sensing platform from which we can extract rich context and content-aware information. From this perspective, smartphones serve as the ideal platform for sensing daily routines from which people's life styles could be discovered.

A. SYSTEM DESIGN

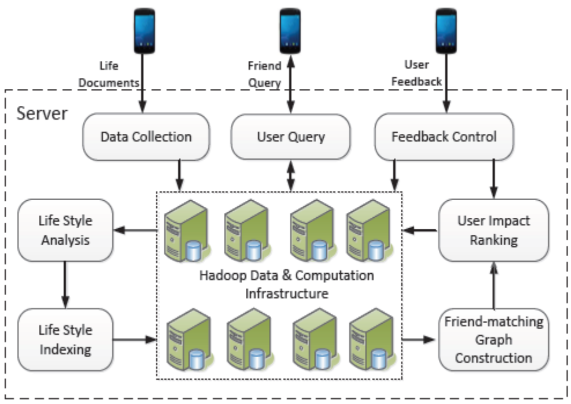

Fig.1System Architecture

II. LITERATURE SURVEY

Going Deeper Underground: Using accelerometers on mobile devices to enable positioning on underground public transportation systems by Thomas Stockx Expertise Ctr. For Digital Media[1] Latent Dirichlet Allocation by[2]An Integrated Monitoring System for Smartphones Christopher Miller University of Notre Dame[3]Discovering Personal Places from Location Traces by Changqing Zhou, Shashi Shekhar, Loren Terveen [4]A Survey of Friendbook Recommendation Services by [5].

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III. PROPOSED SYSTEM

Our proposed solution is also motivated by the recent advances in smartphones, which have become more and more popular in people's lives. These smartphones (e.g., iPhone or Android-based smartphones) are equipped with a rich set of embedded sensors, such as GPS, accelerometer, microphone, gyroscope, and camera. Thus, a smartphone is no longer simply a communication device, but also a powerful and environmental reality sensing platform from which we can extract rich context and content-aware information. From this perspective, smartphones serve as the ideal platform for sensing daily routines from which people's life styles could be discovered. In spite of the powerful sensing capabilities of smartphones, there are still multiple challenges for extracting users' life styles and recommending potential friends based on their similarities. First, how to automatically and accurately discover life styles from noisy and heterogeneous sensor data? Second, how to measure the similarity of users in terms of life styles? Third, who should be recommended to the user among all the friend candidates? To address these challenges, in this paper, we present Friendbook, a semantic-based friend recommendation system based on sensor-rich smartphones.

FEATURES OF PROPOSED SYSTEM:

- Friendbook is the first friend recommendation system exploiting a user's life style information.
- It uses the probabilistic topic model to extract life style information of users.

A. IMPLEMENTATION MODULES

- Life Style Modeling
- Captcha Authentication
- Captcha Guessing Attacks
- Security Underlying Captcha

- **Life Style Modeling**
  In this module, lifestyle modelling users create a profile with life style. We analyze the life style attribute using access the friend Book.

- **Activity Recognition**
  Generally speaking, there are two mainstream approaches: supervised learning and unsupervised learning. For both approaches, mature techniques have been developed and tested. In practice, the number of activities involved in the analysis is unpredictable and it is difficult to collect a large set of ground truth data for each activity, which makes supervised learning algorithms unsuitable for our system.

- **Life Style Extraction using LDA**
  In this module life style attribute using to conversation between two members. To analyse the attributes used in chatting with others. To start chatting with others using life style extraction algorithm using LDA.

- **Retrieval Activities**
  In Friendbook, since we are to only compare "similarity" in activities or topic patterns, there is no need to infer the physical meaning of each cluster center or topic. On the other hand, not revealing the actual physical meaning of activities and topics also has advantages from the perspective of preserving privacy

IV. RESULTS

Fig.2 shows the probabilistic topic of model to extract the life style information of users.

Fig.3 shows the log-in page, upon log-in user is redirected to the registration page where user is requested to register.

Fig.4 shows the user's profile probabilistic topic of model to extract the life style information of users.

Fig.5 shows the view friends profile probabilistic topic of model to extract the life style information of users.

Fig.6 shows the chat system between user and friends.

Fig.2. LIFE STYLE INFORMATION OF USERS

Fig.3. User registration page

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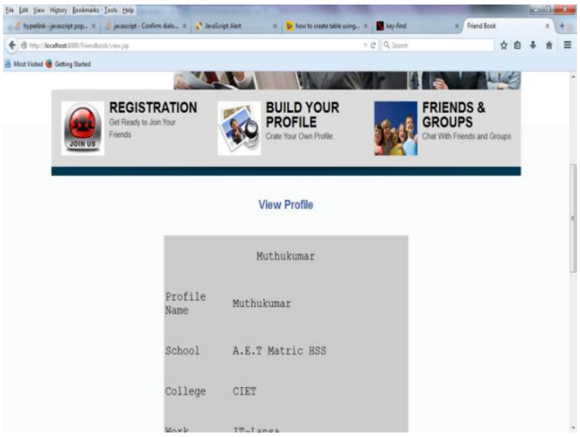

Fig.4. User's profile

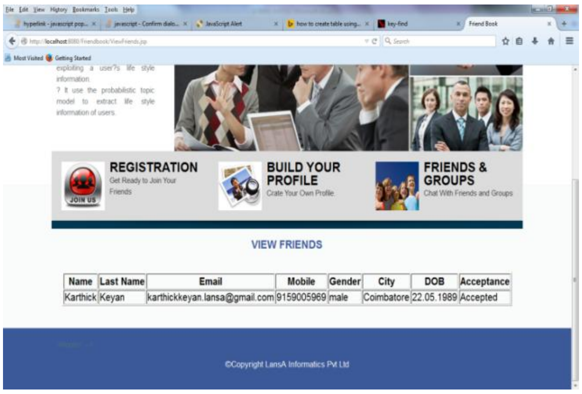

Fig.5. View friends profile

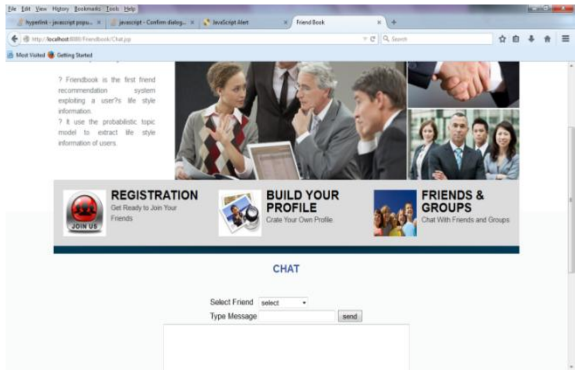

Fig.6. Chat System

V.CONCLUSION

In this paper, we presented the design and implementation of Friend book, a semantic-based friend recommendation system for social networks. Different from the friend recommendation mechanisms relying on social graphs in existing social networking services, Friendbook extracted life styles from user-centric data collected from sensors on the smart phone and recommended potential friends to users if they share similar life styles. We implemented Friendbook on the Android-based smart phones, and evaluated its performance on both small scale experiments and large-scale simulations. The results showed that the recommendations accurately reflect the preferences of users in choosing friends. Beyond the current prototype, the future work can be four-fold. First, we would like to evaluate our system on large-scale field experiments. Second, we intend to implement the life style extraction using LDA and the iterative matrix-vector multiplication method in user impact ranking incrementally, so that Friendbook would be scalable to large-scale systems. Third, the similarity threshold used for the friend-matching graph is fixed in our current prototype of Friendbook. It would be interesting to explore the adaption of the threshold for each edge and see whether it can better represent the similarity relationship on the friend-matching graph. At last, we plan to incorporate more sensors on the mobile phones into the system and also utilize the information from wearable equipments (e.g., Fitbit, iwatch, Google glass, Nike+, and Galaxy Gear) to discover more interesting and meaningful life styles. For example, we can incorporate the sensor data source from Fitbit, which extracts the user's daily fitness info graph, and the user's place of interests from GPS traces to generate an info graph of the user as a "document". From the info graph, one can easily visualize a user's life style which will make more sense on the recommendation. Actually, we expect to incorporate Friendbook into existing social services (e.g., Facebook, Twitter, and LinkedIn) so that Friendbook can utilize more information for life discovery, which should improve the recommendation experience in the future.

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