Life Style Based Friendbook System Using Semantic-based Method
Kavita D. Avhad1, Kanchan S. Jadhav2, Pooja S. Pagare3, Sumedha P. Thakur4, Prof. P. S. Desai5

1Department of Information Technology, S.N.J.B’s KBJ COE, Chandwad, avhadkavita16@gmail.com
2Department of Information Technology, S.N.J.B’s KBJ COE, Chandwad, chavandkanchan.endm@gmail.com
3Department of Information Technology, S.N.J.B’s KBJ COE, Chandwad, poojapagare1995@gmail.com
4Department of Information Technology, S.N.J.B’s KBJ COE, Chandwad, tsumedhau0@gmail.com

Abstract- Friendbook System is a semantic-based friend recommendation system for social networks, which suggests friends to users based on their life styles. By taking advantage of smartphones which is sensor-rich, Friendbook System discovers life styles of users from user-centric sensor data collected at servers, measures the similarity of life styles between users, and suggests friends to users if their life styles have high similarity. We model a system from which users 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 user's influence in terms of life styles with a friend-matching graph. Upon receiving a request, Friendbook System returns a list of people with highest suggested scores to the query user. To improve the recommendation accuracy of Friendbook System we integrate a feedback mechanism. We will implement Friendbook on the Android-based smartphones, and its performance will evaluate on small-scale experiments.

Keywords- Friendbook, Friend recommendation, mobile sensing, social networks, life style

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 positioned 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 [2]. One challenge with existing social networking services is how to recommend a good friend to a user. Most of them rely on pre-existing user relationships to pick friend candidates. For example, Facebook relies on a social link analysis among those who already share common friends and recommends symmetrical users as potential friends. Unfortunately, this approach may not be the most appropriate based on recent sociology findings. According to these studies, the rules to group people together include: 1) habits or life style; 2) attitudes; 3) tastes; 4) moral standards; 5) economic level; and 6) people they already know. Apparently, rule #3 and rule #6 are the mainstream factors considered by existing recommendation systems. Rule #1, although probably the most intuitive, is not widely used because users’ life styles are difficult, if not impossible, to capture through web actions. Rather, life styles are usually closely correlated with daily routines and activities. Therefore, if we could gather information on users’ daily routines and activities, we can exploit rule #1 and recommend friends to people based on their similar life styles. This recommendation mechanism can be deployed as a standalone app on smartphones or as an add-on to existing social network frameworks. In both cases, Friendbook can help mobile phone users find friends either among strangers or within a certain group as long as they share similar life styles.

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.

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.

The rest of the paper is organized as follows. Section 2 discusses literature survey. Section 3 discusses system architecture. Section 4 provides the modules. Finally, we conclude the paper and present the future work in Section 5 and 6 respectively.

II. LITERATURE SURVEY

As we know that friend recommendation is important issue in social networking sites. There are various systems and methods available for friend recommendation. But there are some disadvantages of these systems used in mobile computing for a most appropriate friend recommendation. Recommendation systems can be divided into two areas of focus: object recommendation and link recommendation. Companies such as Amazon and Netflix emphasize object recommendation where products are recommended to users based on past behavioural patterns. Social networking sites such as Facebook and LinkedIn focus on link recommendation where friend recommendations are presented to users. Our project is to develop friend recommendations within social networks. The recommendation algorithms employed by sites such as Facebook are proprietary. However, through observation, it is apparent that a friendsCofCfriends approach is being used. This approach is useful and efficient due to ease of implementation and the nature for humans to be drawn together through association. So we are moving towards the Friendbook system based on Life Style. Recommendation systems that try to suggest items (e.g., music, movie, and books) to users have become more and more popular in recent years. For instance, Amazon recommends items to a user based on items the user previously visited, and items that other users are looking at. Netflix and Rotten Tomatoes recommend movies to a user based on the user's previous ratings and watching habits. Recently, with the advance of social networking systems, friend recommendation has received a lot of attention. Generally speaking, existing friend recommendation in social networking systems, e.g., Facebook, LinkedIn and Twitter, recommend friends to users if, according to their social relations, they share common friends. Meanwhile, other recommendation mechanisms have also been proposed by researchers. For example, Bian and Holtzman [4] presented MatchMaker, a collaborative filtering friend recommendation system based on personality matching. Kwon and Kim [11] proposed a friend recommendation method using physical and social context. However, the authors did not explain what the physical and social context is and how to obtain the information. Yu et al. [14] recommended geographically related friends in social network by combining GPS information and social network structure. Hsu et al. [10] studied the problem of link recommendation in weblogs and similar social networks, and proposed an approach based on collaborative recommendation using the link structure of a social network and content-based recommendation using mutual declared interests. Gou et al. [9] proposed a visual system, SFViz, to support users to explore and find friends interactively under the context of interest, and reported a case study using the system to explore the
recommendation of friends based on people's tagging behaviours in a music community. Activity recognition serves as the basis for extracting high-level daily routines (in close correlation with life styles) from low-level sensor data, which has been widely studied using various types of wearable sensors. Zheng et al. [15] used GPS data to understand the transportation mode of users. Reddy et al. [12] used the built-in GPS and the accelerometer on the smartphones to detect the transportation mode of an individual.

III. SYSTEM ARCHITECTURE

We give a high-level overview of the Friendbook system. Figure 1.1 shows the system architecture of Friendbook, which adopts a client-server mode where each client is a smartphone carried by a user and the servers are data centres or clouds. On the client side, each smartphone can record data of its user, perform real-time activity recognition and report the generated life documents to the servers. It is worth noting that an online data collection and training phase is needed to build an appropriate activity classifier for real-time activity recognition on smartphones. As each user typically generates around 50MB of raw data each day, we choose MySQL as our low level data storage platform and Hadoop MapReduce as our computation infrastructure. After the activity classifier is built, it will be distributed to each user's smartphone and then activity recognition can be performed in real-time manner. As a user continually uses Friendbook, he or she will accumulate more and more activities in his or her life documents, based on which, we can discover his or her life styles using probabilistic topic model.

![Figure 1: System Architecture of Friendbook](image)

On the server side, seven modules are designed to full the task of friend recommendation. The data collection module collects life documents from user's smartphones. The life style analysis module with the probabilistic topic model take out the life styles of users. Then the life style indexing module puts the life styles of users into the database in the format of (life-style, user) instead of (user, life-style). The friend-matching graph construction module to show the similarity relationship between users' life styles can construct a friend-matching graph accordingly. The impacts of users are then calculated based on the friend-matching graph by the user impact-ranking module. The user query module takes a user's query and sends a ranked list of potential friends to the user as response. The system also permit users to give feedback of the recommendation results which can be processed by the feedback control module.

IV. MODULES

Two modules are there in our system admin module (server module) and user module (profile module).
a. Admin Module
Friendbook system adopts the client-server architecture. So there is Admin module and User module. On the server side the data processor extracts users data which is collected at the server. According to that data the friend matching graph will construct. The request interpreter takes the request from user and recommend friends to user according to the matching graph. Admin can create a group, edit a group and also can delete group. Admin can store centralized data of users collected at the server. Admin has the authority that he can view user profile. Admin has the work that to manage registered user. Also he has to manage event and group. When user sends some query then admin has to manage that query. Admin will generate the report of user information.

b. User Module
User module is nothing but the client side of the architecture. By using the sensor-rich android system we can analyse the users life style. Communication component is used to send query to admin module to recommend a friend and admin will give response of that query. Firstly, user has to login with their user id and password. If the user is authorized person then he/she can create his own profile, also update and manage his own profile. User can view his own profile. User can send requests to his friends and can add friends in his friend list.

CONCLUSION
The proposed friend matching method is semantic-based instead of conventional keyword-based or relation-based as most existing networks select. Instead of performing only activity recognition, we further utilize temporal correlations among activities to conclude interests of human being. We propose a two-tiered privacy preserving mechanism at the user side to protect user privacy. We propose an effective similarity metric for measuring the similarity of interests between different users, as well as a dynamic programming search algorithm to find the similarity of any pair of users. We are implementing a prototype system using mobile phones and evaluation demonstrates the effectiveness of proposed approaches.

FUTURE WORK
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 equipment’s (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 infograph, and the user’s place of interests from GPS traces to generate an infograph of the user as a “document”. From the infograph, 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, LinkedIn) so that Friendbook can utilize more information for life discovery, which should improve the recommendation experience in the future.

REFERENCES