International Journal of Science and Research (IJSR)
ISSN (Online): 2319-7064
Index Copernicus Value (2013): 6.14 | Impact Factor (2014): 5.611

A Survey Paper on FriendFinder: A Lifestyle based Friend Recommender App for Smart Phone Users

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Abstract: ***Today's Social Networking services focuses towards suggesting you friend's based on users' social graph or Geo-location based, which neither take users' life style into account or users' liking ,disliking etc. Suggesting friends based on social graphs may not be the best preference for the users. In this paper, we present FriendFinder, a novel semantic-based friend suggesting system which suggest friends to users based on their life style and daily curricular activities on mobile phone instead of social graphs. FriendFinder captures users' data i.e. daily activities and work done through mobile, for ex: - App Usage, App Frequency, Browser Activities etc. Then we create a user profile with all gathered data and find most relevant matching profiles of existing candidate friend's matching our profile for similarity and suggesting the result out of similarity test to the user as a friend.***

Keywords: Friend recommendation, mobile sensing, life style, social networks, app usage, app frequency, browser activities, categories

1. Introduction

Before smart phone even existed, people used to make friends based on people they interacted with in daily life, people who work with them or the one living in the neighborhood. We call friends made using this fashion as Geo-Location friends. With the growth of technology, social networking sites started capturing users' social link and recommend friends based on the social link. Now days there are numerous social networking sites which keep your social graph into picture for recommending you friends. For Example: - Face book keeps a track of social link analysis for common friends among users and suggest them friends. But this method for friend suggestion may not be most effective according to the sociology findings. These Studies suggest that people should be grouped based on following things:

1. Life Style/Daily Circular Activities.
2. Attitude.
3. Likings/Disliking.
4. Tastes.
5. Moral Values/Standards.
6. People they know.

Apparently Rule #4 and #6 are the point of focus for most of the social networking sites today. But as per the studies, Rule #1 plays an important role in finding perfect similar friend for the user.

Users' life style are difficult to capture, as life style information can be gathered from daily circular activities or daily routines. Today people almost spend on an average 9-10 hours with their mobile. It is said that "No one knows you better than your mobile". Therefore, we can use the high mobile computation powers and rich-sensors to capture users' daily data using their daily activities data via browsing activities and use these data to recommend friends for them. This recommendation system that we are suggesting can be used as a standalone app or can be used as an extension/framework for existing social networking sites like Face Book. In both cases FriendFinder can help to find them friends like them rather than some strange people based on common friends.

In our daily lives, we may do numerous activities, which may form a meaningful distinguishable category from n-number of activities. Using these categories we can point out likings, disliking of the user to that particular activity. Not necessary every activity a user does, have to be considered to be his liking. So for this reason we also try to capture the frequency at which the activity is done in daily routine. So, from the frequency and using the category ratio we can find the statistical data about the liking of the activity and find a friend to the user who has similar interest in that particular category of the activity. In this particular paper, we use the key-word activity in context of actions like "Browsing", App Usage" , "App Frequency" and refer these activities to categories like "Technical", "Gaming", "Social", "Art and Literature". "Sports" etc. To understand the life style model, we picture an analogy of user's life style, activities and categories as given below: -

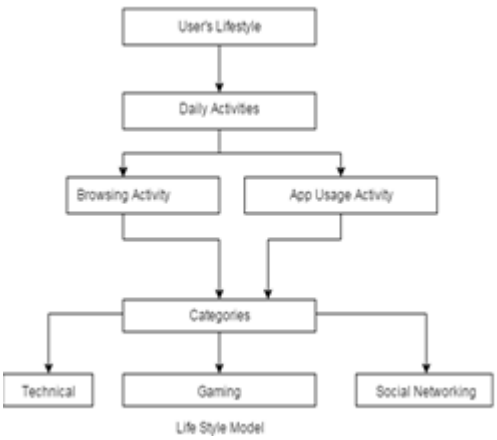

Figure 1: User Life Style Model

In the above figure, we try to gather user's life style data via daily mobile activities which can be browsing activity and app usage activity, which can be categorized into Technical, Gaming, Social Networking, Literature etc.

Our app is inspired by the recent growth and advancements in mobile technology which are acquired by rich-sensors, great computational power, high processors etc. Using this sensing capabilities and also by gathering and extracting rich data content-aware information, we can create a meaningful profile for the user. So this is the base perceptive for sensing daily circular activity of a user. In spite of great computational powers and sensing capabilities, there are still many challenges for extracting users' life styles and suggesting potential friends. Challenges like how to extract relevant and useful data out of so much heterogeneous and noisy data? Secondly how to measure similarities of users in terms of life styles? Third on what basis we should recommend friend to users among all candidates? To address these challenges, we present FriendFinder, a life style based friend recommender app. The key contribution of this work can be summarized as follows: -

- We capture users' daily mobile activities like browsing history and app usage, app frequency and store the most relevant data out of all noisy data.
- We compare users' profile with other candidate friend's profile using category similarity match between profiles.
- We give category the highest ranking system for profile matching system.
- We integrate a users' feedback mechanism through which we can improve our recommendation system more effectively.

The rest of the paper is organized as follows: - Section 2 discusses Literature Survey. Section 3 provides an overview of Proposed Work.

2. Literature Survey and Related Work

In [1], the author used users' work profession or daily activities like "walking", "shopping", "sitting", "typing" etc. as life style activity. Gathering this data author tries to extract relevant data and using pattern matching algorithms author recommends candidate friends to the user. But using only professional data may not be the best case to suggest friend. This method also comes with a disadvantage that it is very difficult to capture users' profession's data.

Later, recommender system these days, which tries to suggest products like (books, daily use goods, music etc.) to users' have become a popular strategy now-a-days. For instance Flipkart [2] recommends item to user based on previous browsing history or previous visited item. Soundwave [3] helps you to discover your music liking based on your most played song types. Netflix [4] tries to suggest movies to user based on users' rating system and watching habits. These all recommender system tries to use user's previous history with no frequency rate, to suggest item. This may not be the most useful product for the user, but still gets a recommendation just because he visited or purchased that item previously. Thus, this is the major disadvantage of this recommender system.

Advancement in social networking systems, friend suggestion has gained a lot of focus these days. For example: - Social networking sites like Face Book [5], Twitter, LinkedIn recommends friend to user base on social link analysis. But just on basis of common friend's you cannot completely or efficient suggest friends to the user.

Further Bian and Holtzman [6] suggested MatchMaker, a collaborative friend recommendation system based on user personality and attitude matching. Also Kwon and Kwin [7] suggested a friend recommender system based on users' social and physical context. In this paper author, however did not explain how actually you collect social and physical context data and use to suggest friends.

Growing mobile technologies like GPS was further used to collect Geo information. Yu et al. [8] suggested geographically related friends in social networking by using and collecting GPS data and social structure. Link recommendation based on weblogs and similar social networks also gained lots of attention these days. Hsu et al. [9] studied the link recommendation problems in web logs and social networks, and suggested a method based on collaborative recommendation using link structure andsocial network and content-based recommendation using mutual declared interests.

Activity serves the base purpose for users' life style model development. From high-level daily curricular activity, to low-level sensor data, which has been widely used for data collection has got a lot of attention these days. Lester et al. [10] used collected data from wearable sensor to recognize users' daily activity based on Hidden Markova Model (HMM).

3. Proposed Work

In this survey paper, we use mobile activities to capture users' life style. Mobile activities like Browsing activity and App Usage Activity, App Frequency can be used as a key measure to collect relative data. This activity can be further categorized into low-level abstractions like "Gaming", "Technical", "Social", "Arts and Literature", "Sports" etc. Then we save this data on cloud. After then, when the user seeks to suggest friends for himself, we use this gathered data to match his profile with candidate friends profile to find the best similar matching profile based on category ranking. We will study this further using system architecture diagram given below: -

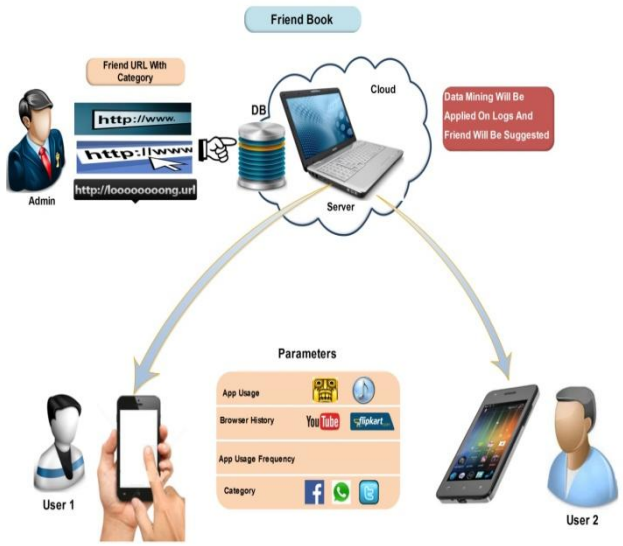

Figure 2: FriendFinder System Architecture

FriendFinder adopts a client-server architecture where each user carrying a mobile phone is a client and the server is cloud server. The above architecture can be explained as follows: -

1) First a new user will register to FriendFinder.
2) Secondly he will login to the app with correct username and password.
3) Then the moment the user is logged in, the app will start collecting users' mobile activity data like browsing activity and app usage with app usage frequency.
4) This data will be stored to the cloud against the user profile and will be continuously updated whenever user is logged in again.
5) Then the user will seek for friend's, asking the app to suggest him some friend's, the app will use his stored data which will be pulled from cloud and similarity algorithms will be applied against his profile and candidate friend's profiles which are already registered in the app, and profile similarity matching will be done based on ranking system on category.
6) The most relevant matching candidate friend's profile will be shown as output of step 5, and will be suggested as friends to the user.
7) The app will also contain discussion forum, wherein any two random users can chat with each other and share pictures or posts about any category. They can also comment on the post.
8) The comments posted in Step 7 is stored by our app and text mining will be applied to the comments regarding whether the user has a liking or a disliking about that category and can be used as a source of data collection.
9) We will also include a feed-back mechanism wherein the user can post a feed-back about friend recommendation and can be used as a measure to improve the algorithm efficiency for suggesting friend.

4. Conclusion

This survey paper helps you to get deep information on how link analysis and social content and recommender system has grown rapidly these years. Each previous method tries to use some link analysis to get users' attention, which comes with some disadvantages like relying on social graphs and geo-location in existing social network. Thus, we present you FriendFinder a novel semantic based friend finder, which uses user's daily activities data gathered from mobile phone to recommend friends to the user in a more precise and accurate manner.

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