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A Survey of Friendbook Recommendation Services

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Abstract: ***In this paper, we have presented a literature review of the modern friend recommendation services. 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 smartphone, 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.***

Keywords: Friendbook, recommendation, social network, lifestyle

1. Introduction

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.

As time passes, World Wide Web (WWW) goes on growing. Lots of information is available on WWW. All the information which we get is not relevant, only few of them are relevant. When a user tries to search something on WWW s/he lands up with thousands of result. As a result, s/he will mess up with huge information. Hence fetching the actually required details becomes cumbersome and time consuming. This gives rise to data filtering system. In early days, for data filtering, Information Filtering (IF) was used. IF was basically developed for filtering documentation, articles, news etc. Looking to our era, e-commerce is growing explosively. Whenever a user makes a search for particular item on internet to buy, s/he will get many options. Looking at the options user gets confuse what to buy, and will not able to sort the item that is suitable to him/her. This problem gave rise to Recommendation System [RS]. A recommender system is a personalization system that helps users to find items of interest based on their preferences. Recommender systems are efficient tools that overcome the information overload problem by providing users with the most relevant contents [8].

The importance of contextual information has been recognized by researchers and practitioners in many disciplines including Ecommerce, personalized IR, ubiquitous and mobile computing, data mining, marketing and management. There are many existing e-commerce websites which have implemented recommendation systems successfully. We will discuss few website in our coming section that provides recommendation. Items are suggested by looking at the behavior of like-minded-users. Groups are formed of such users, and items preferred by such groups are recommended to the user, whose liking and behavior is similar to the group. In our model we have incorporated user preferences obtained from Social Networking Site. Social Networking sites are used intensively from last decade. According to the current survey, Social Networking sites have the largest data set of users. Each social networking site notes/records each and every activity of user (like: what user likes? what user is doing? what is user's hobby? Etc). Social Networking site will prove to be largest domain in understanding the user behaviour. One of the best examples of social networking is FACEBOOK. According to current news FACEBOOK is trying to develop algorithm, to understand user behavior. Social Networking sites can help us in getting important information of users, such as age, gender, location, language, actives, likes etc. our model takes into account these parameters of the user to recommend books. Most of the friend suggestions mechanism relies 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. 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.

2. Literature Survey

Recommendation systems can be divided into two areasof focus: object recommendation and link recommendation. Companies such as Amazon and Netflix emphasize object recommendation where products are recommended to users based on past behavioral patterns. Social networking sites such as Facebook and LinkedIn focus on link recommendation where friend recommendations are presented to users. The work we present in this paper focuses on the latter, in which we 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 [2], [6], [9], [10]. Similar network based approaches such as graph based induction [11] and link mining [12], [13] have been considered but fall in comparison to the effectiveness and efficiency of a friend of friends approach. Kuan et al. proposes an algorithm to locate groups using a transitive extension based approach [14].

This research proposed the use of a 1.5Cclique extension method to derive sub structures, or communities, within social networks. Results showed that this method was fairly effective in finding community of friends. However, this method does not provide insight into how these communities are formed. That is, it is significant to understand what common interests cause a formation in these communities. Recent research has identified the potential effectiveness of combining complex network theory and genetic algorithms. Silva et al. treated the recommendation problem as a filtering problem where a genetic algorithm was used to optimize three indices derived from structural properties of social networks [7]. The result from this study was acknowledged as a baseline to initial work using a new methodology.

Study of few recommendation pattern used by websites: Amazon recommendations change regularly based on a number of factors. These factors include time and day of purchase, rate or like a new item, as well as changes in the interests of other customers. Because your recommendations will fluctuate, Amazon suggests you add items that interest you to your Wish List or Shopping Cart. E-Bay recommends product on bases of features of items. You Tube recommends items based on like/dislikes concept. In.com recommends the songs that are popular, songs from the same movie, similar actor-actress, artist, director etc. RS is used to filter the item/product according to the user interest [1],[2] and looking at the like-minded-users [3].

There are many popular recommendation algorithms based on collaborative filtering [3],[4]. Collaborative Filtering creates a group of users with similar behaviour, and finds the items preferred by this group. Ratings from user will be taken from user in two ways explicit rating and implicit rating [5]. CF algorithms are divided into two types, memory-based algorithm and model based algorithm. Memory-Based algorithm simply stores all the user ratings into memory. There are two variants of memory-based recommendation and both are based on the k-Nearest Neighbour algorithm: user-based filtering and item-based filtering. In User - Based Filtering, Rating matrix is used to find neighbouring users for the active user. This is done by using cosine or Pearsons correlation matrix. After knowing the neighbouring user for active user, items preferred by neighbouring users will be sorted on frequency and rating of items. Items that are not known to active user will be recommended. Item Based Filtering finds the most similar items. Items are considered to be similar when the same set of users has purchased them or rated them highly. For each item of an active user, the neighbourhood of most similar items is identified. Collaborative filtering techniques can be expanded to other algorithms such as tag based and attribute aware and trust aware recommender systems. A diffusion-based recommendation algorithm is proposed [9] which consider the personal vocabulary. A hybrid user profiling strategy is proposed [10] that take advantage of both content-based profiles describing long-term information interests that a recommender system can acquired along time and interests revealed through tagging activities, with the goal of enhancing the interaction of users with a collaborative tagging system. Trip Tip system is proposed [11] to help negotiate travellers way through the immense amount of information that is often available by recommending a set of choices. Trip Tip recommends to the users the next place, which they would most likely want to visit given their preference in previous choices. To generate this information, tags that are attached on a given place by users give the characteristics of a place and the reasons for visiting the place. Attribute-aware method pro-posed [12] takes into account item attributes, which are defined by domain experts. In addition, content based algorithms can provide very accurate recommendations [13]. Collaborative tagging systems (CTSes), allow users to freely assign tags to their collections, provide promising possibility to better address the above issues. A generic method [14] was proposed that allows tags to be incorporated to the standard collaborative filtering, via reducing the ternary correlations to three binary correlations and then applying a fusion method to re-associate these correlations. Some diffusion-based algorithms are recently proposed for personalized recommendations. A spreading ACTtion based collaborative filtering [15] was proposed which is essentially an iterative diffusion process. A diffusion-based [16] top-k collaborative filtering, performs better than pure top-k CF and pure diffusion-based algorithm. Besides recommender systems, research on contextaware computing seems promising.

Context-awareness allows software applications to use information beyond those directly provided as input by users [17]. More recently, there were attempts [18] to define architectures for context-aware recommender. However, authors don't give details about the deployment of such architectures. An algorithm is proposed [19] which adopt item-based algorithms in the early stage of the cold-start period and eventually switching to SVD based algorithms. A collaborative filtering recommendation algorithm based on the implicit information of the new users and multi-attribute rating matrix is proposed [20] to solve the cold start problem.

3. Conclusions

In this paper, we have elaborated the concept of friend service recommendation service. We have also presented a comprehensive survey of the common friend recommendation services of social networks. Recommender systems are efficient tools that overcome the information overload problem by providing users with the most relevant contents [8]. The importance of contextual information has been recognized by researchers and practitioners in many disciplines including Ecommerce, personalized IR, ubiquitous and mobile computing, data mining, marketing and management.

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