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Link Recommendation System Based on Lifestyles of Users

KEYWORDS: link recommendation system; different friend recommendation system; lifestyles; recommendation parameters; social networking services.

Tofik R. Kacchi
M.Tech in CSE GCOE, Amravati, India

Prof. Anil V. Deorankar
Associate Professor, CSE GCOE, Amravati, India

ABSTRACT *In this paper, we have proposed and presented a literature survey using link recommendation system based on lifestyles of users which include the different techniques, concepts and ideas used in the process of recommendation. Social networking sites indicate friend recommendation systems in aid to providing better user experiences. Online friend recommendation is a rapid emerging topic in web mining. Recent social networking services suggest friends to users based on their social graphs and mutual friends. Every friend recommendation system is using different factors for recommending friends. These factors may include social graph, tastes, blood group, moral standards, nearby-location, habits, attitudes, profession, etc. But different challenges in the process of recommendation may arise like how to recommend a good friend (according to need) to the user, how to preserve user's privacy, how to get one's interest without one's specification which one need to overcome.*

Introduction

Recommendation systems can be divided into two areas of focus: object recommendation and link recommendation[2]. 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. So Facebook suggests people we may be (or should be) friends with. Netflix suggests movies we might like. Amazon suggests products to buy. How do they do that? In this paper, we will learn two simple ways to make such suggestions, called collaborative filtering and content-based filtering.

Collaborative filtering says that that, if our past behavior/ preferences were similar to some other users, then our future behavior may be as well. As a concrete example, suppose that I like John, Paul, and George, and other people like John, Paul, George, and Ringo. Then it stands to reason that I will like Ringo as well, even if I had never previously heard of him. The recommender system does not have to understand anything about what "John", "Paul", "George", and "Ringo" are — they could even be brands of toilet paper, and the algorithm would work identically[12].

Content-based filtering considers the characteristics of the things I like, and it recommends similar sorts of things. For instance, if I like "Billie Jean", "Crazy Train", and "Don't Stop the Music", then I might like other songs in the key of F-sharp minor, such as Rachmaninoff's "Piano Concerto No. 1", even if no one else has ever had that particular set of favorite songs before[12].

A social network is a system where nodes (clients) are linked with one another by relationship (edges). The edges are undirected and the quantity of edges demonstrates the quantity of companions a client has. A percentage of the remarkable interpersonal organizations are Facebook, Google plus LinkedIn and so forth. Each client keeps up a profile. There are numerous properties in the profile which can be utilized to anticipate the quality of ties between diverse clients.

The rise of social networks from the Internet sparked a major reform in information spread. We have observed that right from the data to search and from search to social interaction; users around the galaxy are now deeply involved with the Internet. With the help of social networks, user-generated record/document is comparatively more accessible than before. A powerful aspect of social networks is the customization of user experiences.

Some social networking systems advise friends to users based on their social graphs (Friends of friends or common friends), which may not be the most correct to reflect a user's preferences on friend selection in real life. In some system, a semantic based friend recommendation system for social networks is used, which advice the friends to users based on their life styles but not of social graphs. This system measures the similarity of life styles between users, and advice the friends to users if their life styles have high similarity. This system proposes a similarity metric to determine the similarity of life styles between users, and calculate users' impact in terms of life styles with a graph. Upon receiving a query, the system recommends a list of people with highest recommendation probability to the query user[1].

According to these studies, the rules to group people together which I will use may include (i.e. recommendation parameters): habits, blood group, location, profession, etc[1].

II. PROPOSED WORK

To analyze the recognition of activities properly, an analogy between word-documents and people's daily lives is represented as shown in Figure 1. The figure clearly shows that: documents as collection of topics (or set of topics), and topics as set of words. Similarly, we can treat our Life documents (or daily lives) as a set of life styles (or topics), and every single life style as a set of activities. It is noticeable here that, we refer to daily lives as "life documents",

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whose meanings are revealed through their topics, that is nothing but life styles in this paper[3]. Analogous to words which serve as the basis of documents, people's activities certainly serve as the basis of these life documents [3].

Principal friend recommendation system recommends friends to users depending on the parameter which is Friends of friends or common friends, which may not be the most correct or useful to for choosing friend in real life. In the proposed system, a semantic based friend recommendation system for social networks is used, which suggest the friends to users based on their life styles instead of mutual friends or social graphs. The system proposes a similarity metric to measure the likeness of life styles between users, and calculate users' influence with the help of a data structure graph 'G'. Upon getting a query containing a request for friend, the system suggests a list of people according to corresponding desired factor to the user. Here, the rules to cluster people together may include following parameters: habits/lifestyles, people they already know, blood group, qualification/profession, location, etc[1].

In this system, different modules are designed and implemented for the task of friend recommendation. They are as follows:

1. **Data Collection and Data Analysis:** The Collection module collects life documents from the input file or input dataset and stores it into a file in either semi-structured or structured format. The life styles of users are extracted by the life style analysis module. It may use hadoop technology or SQL depending on the type of file as input to it. The implementation results of these modules are depicted as follows:

Let $\overrightarrow{ww}$ = [w1, w2, ... , w_W] be the Set of 'W' Activities

$\overrightarrow{zz}$ = [z1, z2, ... , z_z] be the Set of 'Z' Lifestyles

$\overrightarrow{zdd}$ = [d1, d2, ... , d_n] be the Set of life-documents

Where n = Number of users

and p(w_i | d_k) is the Probability of activity w_i in a life-document d_k

p(w_i | z_j) is the Probability activity w_i in the lifestyle z_j

p(z_j | d_k) is the Probability of lifestyle z_j in a life-document d_k

Fig. 1 Collecting data from the sample dataset

Therefore, according to Probabilistic theory of model, we have

$$p(w_i \mid d_k) = \sum_{j=1}^{Z} \sum_{j=1}^{Z} p(w_i \mid z_j) * p(z_j \mid d_k) \quad \text{.....(1)}$$

It is notable that the left hand side of the above equation can be easily derived with the help of Activity-bag representation for the life-doc d_k. The Activity-bag model is as shown following figure 3.

Fig. 2 Activity-document Representation of the data collected

Let $f_k(w_i)$ be the frequency of occurrence of activity w_i in life-doc d_k

Therefore, we can write

$$p(w_i \mid d_k) = f_k(w_i) / \sum_{i=1}^{W} \sum_{i=1}^{W} f_k(w_i) \quad \text{.....(2)}$$

Life-style vector is given as :

$$\overrightarrow{LL}_k = [p(z_1 \mid d_k), p(z_2 \mid d_k), \text{.....}, p(z_Z \mid d_k)] \quad \text{.....(3)}$$

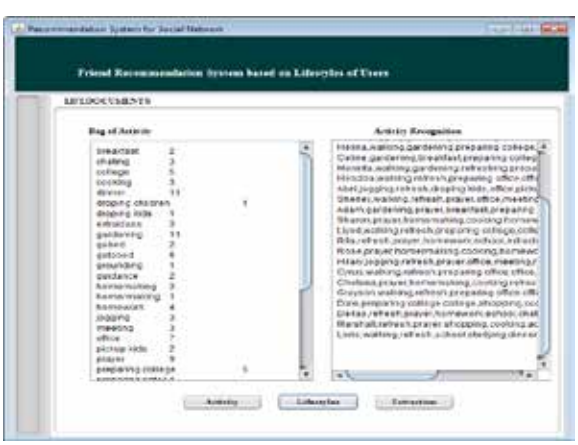

Fig. 3 Bag of Activity representation of the sample dataset & Activity recognition

2. Indexing: Then the life style indexing module puts the input sample data of life styles of users into the database in the format of (life-style, user) instead of (user, lifestyle).

3. Friend-Matching Graph: a graph can be constructed accordingly with the help of graph data structure construction module to represent the similarity between users.

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Fig. 4 Friend matching graph recommending list of similar users to a given user

This module takes a user's request and sends a list of friends to the user as response depending on the similarity found between them.

CONCLUSION

This paper describes the overview about link recommendation technique and ideas, concepts or parameters used for recommendation. The screenshots of the different modules implemented are also presented in this paper.

We conclude that with little modification in the parameters used for recommendations like say take blood group and location parameters, we can develop a friend recommendation system which can be used for health application; finding one's interest without one's specification; to suggest the friend as and when required by analyzing the activities of users using the sensor-rich smartphones, etc. by taking into account the issue of retaining users' privacy.

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