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Privacy Preserving Friend Matching

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Abstract - Every day we are overwhelmed with many choices and options, simultaneously recommendation systems have gained popularity in providing suggestions. Today every web application has its own recommendation system. Whereas, Recommendation systems for social networks are different from other kinds of system, since the item here are rational human beings rather than goods. Hence, the 'Social' factor has to be accounted for when making a recommendation. We considered one of the most popular social Networking sites that is Facebook as it offers impressive features. Here, we are mainly focusing on recommending friend with similar interest which is different among all the existing ones where Facebook uses social graph a friend of friend approach to recommend friend which may not be the most appropriate to reflect a user's preferences on friend selection in real life.

Key Words: **Social Networks, Friend matching, FriendBook, LDA.**

1. INTRODUCTION

Social networking is grouping of individuals into specific groups. Social media is a wide range of internet based and mobile services that allow users to participate in online communities. It is also a platform to built social relations between people who share similar interests, activities, backgrounds and real life connections. Social media also allows individuals, companies, organizations and governments to interact with a lot of people. There are number of websites focus on particular interests which means anyone can be a member, but it does not matter what their hobbies or interests are. Once you are member of community you can be friends with similar interests and can unfriend those friends.

Social networking sites have enormous data set of users, according to the current survey. Every individual social networking site makes record of the activities of users such as his/her likes; what user likes? , what user is doing? , what is user's hobby? Etc. and it has gained main area of focus in understanding the user behavior, One of the best example we might consider is FaceBook. Hence here, in our approach we are making use of user life style as major concern for recommending friends and build relationship among the people with similar interest and help to share information or build communication among likely minded people.

2.LITERATURE SURVEY

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.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 [3] and Rotten Tomatoes [4] recommendmovies 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.

In this paper we considered FriendBook for extracting the user details such as name, interest, email id etc. and we have analyzed its structure. From our study perspective one of the important functions of this network is user interest. User interest is the process by which thoughts and actions of individual are generated and depicted in their profile and can analyze on it to identify his/her life style. This can be widely accepted in social networks.

Hence, the paper aims at fulfilling the development of the following system:

Considering, FriendBook profile data, we calculate probabilities of the topics in the user document using LDA model that is considering the probabilistic method to find dominant life style vector and then recommending to the query user with potential friend whose values are greter then certain specified threshold value.

3.METHODOLOGY

Problem Statement:

Development & Implementation of a Probabilistic model to find the user with similar interest and recommend friend to user.

During the web development phase, the user data is recorded into our database. The user activity from the database is accessed. An algorithm for calculating dominating life style vector of user is developed. LDA

algorithm is a way of automatically discovering topics that the sentences in document has, it finds the topic by calculating the probability of words in document. Similarly in case of FriendBook we apply this method and find the dominant life style vector as below, . The life style of users is extracted by the life style analysis module with the probabilistic topic model, and then

the life style indexing module puts the life styles of users into the database in the format of (life-style, user) The probabilistic topic model can be given as,

P(Wi|dk)=ΣZj=1 p(wi|zj) p(zj|dk)

Where, w-activity
Z-life style
D –set of document and in our case as we are implementing it in FriendBook can be considered as 1 as we are able to fetch the topics directly by considering user activity as whole document.

The topics may be movies, books read, sports etc. and the count of these activities can be accessed based on the permission given by FaceBook developers and the people who logs in to our app and allow us to access the data to recommend them friend of similar interest among the people from our database. As we get the count values we calculate probability of each activity of user using above formula then we find dominating life style vector of user by specifying some assumed threshold value in our case we have considered it as 0.9.let us define this threshold as (alpha) And after finding dominating life style vector of user we find similarity between the users this is done using the below formula,

S=Sc(i,j).Sd(i,j).

where i & j are number of users
Sc=is cosine similarity and
Sd= is distance similarity.
Hence, a cosine similarity can be calculated as below
Between user 1 & user 2,
Sc(U1,U2)=COS(U1,U2)=a.b/|a||b|
Similarly with all the users it is calculated. And distance Similarity is calculated as below,
Sd(U1,U2)=2|D1∩D2|/|D1|+|D2|.
After calculating similarity value for all the user with every Other user we store those values in matrix form from which We recommend a friend to the user who is greater then Some specified threshold value, we have assumed Threshold value as 0.5 in our case and let's consider this Recommending threshold as β(beta).

3.1 Friend Recommendation Results

There are four free parameters used to generate the friend recommendation results, including the similarity threshold for friend-matching graph the threshold that controls the number of dominant life styles, the damping factor ' that emphasizes the importance of the friend matching graph (Eq. 13), and the number of life styles. In our practical experiments, we have used the following values as default through empirical studies, i.e., the similarity threshold Sthr is set to 0.5.

The IDs and recommendation scores of recommended friends are shown in the list.

Note that Friendbook returns the ID of users instead of their real names due to privacy concerns in our experiments.. Users can connect to people in the recommended friend list through our system and also give a score on the recommended friends. Note that we intentionally anonymize the personal information in Figure 9 to protect the privacy of subjects. In the real system, when a user wants to use the system, he/she will be encouraged to complete his/her personal profile, e.g., name ,User ID.

Current User ID	Matching Friend ID	Score
18	1	0.386
18	2	0.154
18	3	0.99
18	5	0.23
18	10	0.85
18	15	0.65

Fig. Similarity Score

Similarity score of each recommended friend will be shown to the user. As shown in Figure user 1 has strong relationship with user 18. user 18 has strong relationship with user 3,user 5 has relationship with the afor rementioned users but not very strong, while user 10 and user 15 have no relationship with others at all. The result is consistent with the ground truth of professions shown in Table 1because people have the same profession usually have the same life style.

4 PROPOSED WORK

In the proposed work, we have focused on Three important phases as below

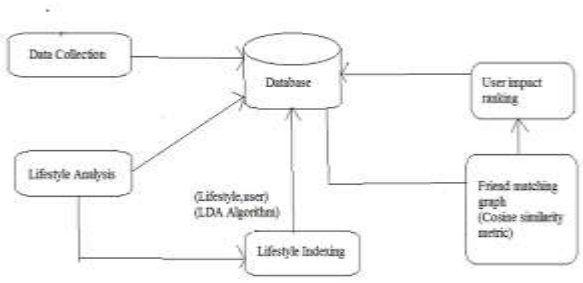

Figure-System Architecture

1. **Creating a user interface application for login**: Web applications that require authorization to access certain information.

2**. Finding dominant life style:** Depending on the activities that user has done we get certain count of the activity, then we calculate probabilities of each life style and consider those values who are greater then some specified threshold value α (alpha). In which the user interacts with the site through our application.

3. **Recommending potential friend:** We calculate the similarity between the users and recommend friends to the query user who are above certain threshold value β (beta). Based on accessing permission given by user for a web application we can get the activities performed by user.

1) Develop and test a methodology to find the users withsimilar interest in online social networks on the basis of a simple metric of their activity level.

2) We calculate the probabilistic values of each activity and find dominating life style.

3) And recommend potential friend .

5. CONCLUSION AND FUTURE WORK

In our approach we presented the design and implementation of Friendtome, a semantic-based friend recommendation system for social networks. Different from the friend recommend at social graphs in existing social networking services, the results showed that the recommendations accurately reflect the preferences of users in choosing friends. Beyond the current prototype, the future work can be concentrated on implementing it on other social networking, and same can be used to build stand alone app and access the user activity through mobile sensors. FriendBook can utilize more information for life discovery, which should improve the recommendation experience in the future.

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