Friend Recommendation Framework for Social Networking Sites using User's Online Behavior (FRF)

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Abstract- **Social network sites (SNS's) have connected millions of users creating the social revolution. User's social behavior influences them to connect with same mentality. Social networks are constituted because of its user or organizations common interest in some social emerging issues. The popular social networking sites are Facebook, Twitter, MySpace, Orkut, LinkedIn, Google plus etc. Which are actually online social networking (OSN) sites. However, the large amount online users and their diverse and dynamic interests possess great challenges to support recommendation of friends on SNS's for each of the users. In this paper, we proposed a novel friend recommendation framework (FRF) based on the behavior of users on particular SNS's. The proposed method is consisted of the following stages: measuring the frequency of the activities done by the users and updating the dataset according to the activities, applying FP-Growth algorithm to classify the user behavior with some criteria, then apply multilayer thresholding for friend recommendation. The proposed framework shows good accuracy for social graphs used as model dataset.**

Keywords- **Social Networking sites(SNS's), Social Entities, Friend Recommendation Framework(FRF), FP-Growth**

I.   INTRODUCTION

The popularity of online social networking sites is getting higher day by day because of the friendliness introduced in the sites and technological advancement. Use of these sites has developed social traditions and behavior in its users[1]. Nowadays, recommendation system has gained its popularity to the researchers because of its versatile notion of integrating different research areas. Research from psychology, human computer interaction, computer vision, data mining etc. are keeping their attention on this research area. A recommendation system generally interacts with its user in most possible friendly way and recommends doing something in its user's favor.

Recommendation systems for SNS's is a new scope of research as social peoples are more interested in online social networking (OSN) sites, like Facebook, Twitter, Flickr, LinkedIn, Myspace, Google plus etc. In the social networking sites, a social entity or user makes connections with other known or unknown social entities, namely friends or partners, and shares their news and views through the profound facilities of the sites. Friends could be offline or real-life friends, classmates, neighbors, colleagues, family members, relatives or anyone having a profile in the OSN sites.

Recommending different aspects in SNS's is a new concept to make people socially sound. Community recommendation, connection or friendship recommendation, birthday remainder, event recommendation, restaurant or vacation spot recommender systems are common findings in the SNS's. Recommending people on social networking sites is worth studying because it is different from traditional recommendation of books, movies, restaurants, etc. due to the social implication of "friending". For example, before adding a friend, one has to consider a lot of things, whether he or she known the personally or his or her likings, activities etc. match with the person he or she wants to add as a friend. Furthermore, the most challenging part in designing a recommendation system for a social network is the privacy issue of the users. With the ever increasing web crimes and identity theft, people are becoming more and more careful in sharing their personal information. Hence, unless a user can trust the system with their data, the system cannot stand and it will be valueless. Exploitation of social network data is the fragmentation of the population of social network users into numerous proprietary and closed social networks. This issue is compounded by the fact that each new game or media application tends to build its own social network around it rather than building upon the rich data available about existing social relationships.

II.   LITERATURE SURVEY

SNS's are an online phenomenon which provides social network based services to support easy message posting, information sharing and inter-friend communication. A social network is a set of people a

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groups of people with some pattern of contacts or interactions between them. The patterns of friendships between individuals, business relationships between companies, and intermarriages between families are all examples of networks that have been studied in the past. Social networking sides (SNS's) provide users with opportunity to connect with their offline friends as well as making new friends with latent ties who otherwise would never have meet them. They also supplement their relationships with close relations and help to maintain the social capital [2]. Understanding the behavior of a particular user in context of SNS's is the main concern to determine the recommendation constraints. L.Jin et al [3] describe the way to understand the user behavior in ONS's. "Connectivity and interaction, traffic activity, malicious behavior, mobile social behaviors" are four issues needed for understanding user behavior in social network [3]. C.Wilson et al [4] mentioned that we can also use "photo comment and wall post as interaction to determine behavior". Different researches have proposed different methods for recommending friend or connections such as clustering method [5-6], "categorizing users interest"[7], cohesions based recommendation system[8]based on" users' social relations and personal information profiles"[9-10], GeoLife -2.0location based recommendation system [11]. Yu Zheng et al [11] proposed a GPS-data-driven social networking service were people can share life experiences and connect to each other with their histories. By mining people's location history that can measure the similarity between users and perform personalized friend recommendation for an individual. A friend recommendation system in biology field is also proposed in[5].The previous approaches do consider user's interest, hence doesn't define the user behavior on a SNS. By identifying user's behavior on SNS's we can identify his/her interest in the SNS and using common and uncommon behaviors a friend recommendation system could be proposed. In this paper we don'tonly consider the familiar or persons having common interests to be recommended as friend, therefore persons having special or unique interests should be recommended as friends. We have proposed a novel friend recommendation framework(FRF) based on user's online behavior on the main contribution associates the definition of user online behavior and the algorithm to recommend a friend.

III. EXISTING SYSTEM

Community recommendation, connection or friendship recommendation, birthday reminder, event recommendation, restaurant or vacation spot recommender systems are common findings in the SNS's. Existing social networking services recommend friends to user'sbased on their social graphs, which may not be the most appropriate to reflect a user's preferences on friend selection in real life. In existing system friend's suggestions are based on the profile details such as school, college, living locations etc.

Limitations
- Less Efficient
- Suggestions are based on user profile
- Unable to find the users of same mindset
- Lack of user satisfaction
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IV. PROBLEM STATEMENT

In SNS, the most challenging part is to recommend friends with the same mentality. Recommendation of suitable friends for a user in a social network based on user interest is a key factor for building a better relationships among people.

V. PROPOSED SYSTEM

In SNS, User's social behavior influences them to connect with others with same mentality. Proposed system is a innovative social networking application which contains all existing features of social networking applications and contains a novel friend recommendation framework(FRF) based on the behavior of users. There are five step sequencing in the framework(FRF): extracting sub-network, finding frequency of the activities, find the common behavior, find the uncommon behavior within the common behavior and finally friend recommendation.
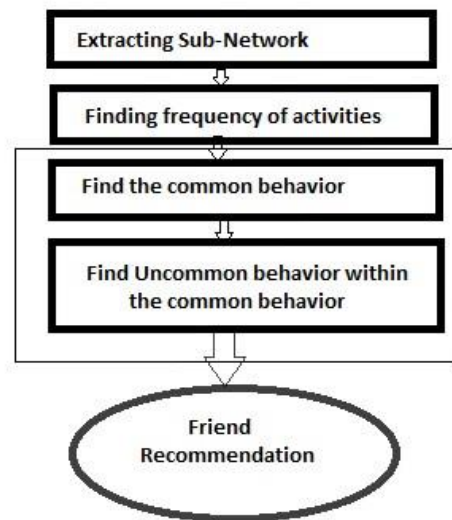
VI. METHODOLOGY
FP Growth
   A. *Friend Recommendation Module based on user interest[AOI]*

Input-Users shared information(texts,photos,videos)
Output-Identification of user's AOI Recommendation of users based on Ci(AOI) and min threshold value (min_recc)

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1. *Algorithm Steps*
   - Scan the User Database(retrieval of user shared information)
   - Tokenization [Keyword extraction method- removing the stop words and retrieving the keywords]
   - Clustering the messages shared by the users(grouping of similar objects)
     - ➢ By comparing with the predefined dataset(created by the admin)
   - Identify the user area of interest (cluster[AOI] with more number of objects)
- Retrieve other users shared information from the database[Ui]
- For each entry Ui[users] in buffer [storage server] do
- Trace all users AOI, for the follow the following steps
  - ➢ Clustering the messages shared by the user(grouping of similar objects)
  - ➢ By comparing with the predefined dataset(created by the admin)
    - Compare the present user AOI with the previous users AOI.
    - Check if (matching count>min_recc) [number of msgs to compare]
    - Put matching count into array count [array list]
    - arraycount.Sort();
    - arraycount.Reverse();
    - retrieve the user details and display [top 10 users]

B. *Friend Recommendation based on User Life Styles/Mentality*

Input-User Life Styles(ULSi), Options(Oi)
Output-Recommendation of User based on Ci and Min Threshold Value (min_recc)

1. *Algorithm Steps*
   - Generate all possible User Life Styles for the user
   - Generate all constraints [lifestyles]
   - For each entry Ui[users] in buffer[storage server] do
   - Trace all user lifestyles then,
   - Compare the values of present user life styles with the previous users life styles.
   - Check if(matching count>min_recc)
   - Calculate the gain
     - ➢ Gain = 2.0 * matching count/min_recc;
- Put Gain into arraycount[arraylist]
- arraycount.Sort();
- arraycount.Reverse();

- Retrieve the user details and display.

C. *Friend Recommendation based on User Life Styles and User DOB*

Input - User Life Styles(ULSi),Options(Oi)+DOB
Output-Recommendation of Users based on Ci and Min Threshold Value(min_recc)

- *Algorithm Steps*
- Generate all possible user life styles and DOB for the user
- Generate all constraints [lifestyles.DOB]
- For each entry lifestyles and DOB then,
- Compare the values of present user life styles with the previous user's life styles.
- Set the MaxDOB and MinDOB(+3,_3)
- Check if(matching count>min_recc && MinDOB<DOB && DOB<MAXDOB)
- Calculate the gain
  - ➢ Gain = 2.0* matching count/min_recc;
- Put gain into arraycount[arraylist]
- Arraycount.Reverse();
- Retrieve the user details and display.

D. *Friend Recommendation based on User Life Styles and Living Locality*

Input-User Life Styles(ULSi), Options(Oi) + LL
Output-Recommendation of Users based on Ci and Min Threshold Value (min_recc)

1. *Algorithm steps*
   - Generate all possible user life styles for the user
   - Generate all constraints [lifestyles, LL]
   - For each entry Ui[users] in buffer[storage server] do
   - Trace all user lifestyles then,
   - Compare the values of present user life styles with the previous user's life styles.
   - Check if(matching count>min_recc)
   - Calculate the gain
     - ➢ Gain = 2.0* matching count/min_recc;
- Put Gain into arraycount[arraylist]
- arraycount.Sort();
- arraycount.Reverse();
- Retrieve the user details and display.

2. *Advantages*
   - System provides the services according to the user interest.
   - System recommends the friends based on the following constraints.

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- ➢ Friend Recommendation based on User Life Styles and User DOB
- ➢ Friend Recommendation based on User Life Styles and Living Locality.
  - • System is user friendly.
  - • Proposed system has customized option for the users.
  - • Proposed system is more reliable.
  - • Proposed system is more efficient

3. Applications
- • System is a social networking application which can be used by all category of users.
- • System can be used as educational based social networking application where students, lecturers and others shares educational information.
- ➢ Students of the same college can get to know each other better.
- ➢ Students can communicate with their classmates as well as seniors to get their doubts solved.
- ➢ Students can provide feedback about lectures.
- ➢ They can play games and puzzles that will enhance their analytical skills.
- ➢ Students can get notifications regarding the college events and placements.
  - • System can be used as medical based social networking applications where medical practitioners shares medical related data.
  - • System can be used to share business data.

VII. CONCLUSION

In this paper, we have proposed a novel friend or connection recommendation framework which could be used in any social networking sites. The framework is based on user's online behavior. In thispaper, we have contributed the user's online behavior definition as well as an approach to use the online behavior to recommend friend. The applications of this framework is huge and this approach could be used to recommend friend, community or group, online games matches with the users behavior or interest and many more. The FP Growth algorithm could be modified to determine a new recommendation system having more accuracy. Different data mining rules could be applied to simplify the model dataset and find the required connection.

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