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# Friend Recommendation System Based on Lifestyle

[1]Dattaprasad S. Ebhad, [2]Nikitesh H. Jain, [3]Shweta S. Mazire, [4]Ashutosh B. Patil, [5]Prof. D. T. Kurian (Guide)
[1, 2, 3, 4] Information Technology, Savitribai Phule Pune University, Pune, Maharashtra, India
[5] Assistant Professor RMD Sinhgad School of Engineering, Pune, Maharashtra, India

***Abstract— Existing social networking sites like Facebook, Google+ etc. recommend friends to their users based on their tastes and people they already know, which may not reflect users' real life preferences on friend selection. In this paper, we present a life style based friend recommendation system for social networks, which recommends friends to users based on their life styles instead of social graphs. By exploiting sensor-rich smartphones, this system attempts to derive life styles of users by using data obtained from sensors, which is highly user-centric. It also measures the similarity of life styles between users, and recommends friends to users if their life styles have high similarity. It allows its users to chat with friends. 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 user's impact in terms of life styles with a friend-matching graph. Upon receiving a request, system returns a list of people with highest recommendation scores to the query user. Finally, this model also integrates a feedback mechanism to improve the recommendation accuracy and users satisfaction.***

***Keywords— Data Mining, Friend Recommendation, Sensors, Android, Smartphones, Machine Learning, Lifestyle.***

## I. INTRODUCTION

Twenty years ago, people usually made friends with others on the basis of their geographical locations such as people working in their office or living in their neighborhood. Friends made through such fashion are called as G-Friends i.e. geographical location-based friends. The emergence of various social networking sites has given a revolutionary approach of making friends. There are various ways to group people or become friends with somebody on social networks. Few of them are 1) Habits/Life style, 2) Tastes, 3) Attitudes, 4)Moral standards, 5)Economic level, and 6)People they already know. Of all these, habits or life style is the most prominent factor but is not widely used by most of the social networks recommendation systems. This is because user's life style is difficult to capture through web actions. So this system is attempting to use a handy tool like mobile phone to capture and model user's lifestyle and recommend friends on the basis of similarity between two users life style. In today's world there are various social networking sites which are basically used for finding and making friends. Social networking sites have gain their position in world of internet. Our project friend recommendation is based on social networking. It is different from other sites as it targets the lifestyle and habit for making new friends. We find user's life style and habit by using handy tool like mobile phone for recommendation system. One challenge with existing social networking services is how to recommend a good friend to a user. Most of them rely 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.

### *1.1 Basic Concept*

In our day to day life we do many course of activities like walking, talking, eating, etc. which have some meaningful sequence. This course of activities altogether having meaningful sequence gives us the user's life style. Consider office work life style, it consists of walking, talking, traveling, typing, etc. In our project we use different type of sensors of android mobile phone like microphone, camera, GPS, gyroscope, accelerometer to this course of work.

Many challenges are there to capture accurate life style from sensor data, to calculate user's life style activity. A big challenge arise from the question "to whom should we recommend as candidate?"

### *1.2 Application*

The challenge can be completed by using a stand-alone application or an add-on to existing social network site. Addition to it the user can also chat with other user and share their views using the app.

## II. LITERATURE SURVEY

The recommendation system is important in every field of social networking. With the recommendation system the recommending things become more popular. Flipkart recommends different type of electronic product; home appliance etc., Netflix and Rotten Tomatoes recommends the movie to user with their rating accordingly. The recommendation system becomes the important part of the social networking and the internet application. There are previous friend

 

recommendation systems like Facebook, twitter, LinkedIn which recommend friend and their mutual friends to each other.

Matchmaker[1], a collaborative filtering friend recommendation system is proposed by Bian and Holtzman. This system is based on personality matching. Kwon and Kim[2] proposed a friend recommendation method using physical and social context. We need to understand working of sensors like GPS provides data to understand the transportation mode of the users. Accelerometer on the smartphones is used to detect the transportation mode of an individual. Easy Tracker[3] used GPS traces collected from smartphones that are installed on transit vehicles to determine routes served, locate stops, and infer schedules.

### *2.1 Existing System*

#### *2.1.1 Match Maker [1]*

Match maker is another recommendation system which recommend user to watch the shows that his social network friends have watched or is watching. Match maker recommend the user to become friends with someone who is matching same TV character and is friend with another users matching TV character.

#### *2.1.2 System by Kwon and Kim [2]*

The friend recommendation system proposed by kwon and Kim is related with the physical and social context. In this recommendation system it recommends the friend having similar physical context. The one more feature of this system is its explicit friendship using social context such as the social network. The scheme combines both the friendship using physical context like location and it using social context such as user's social networks. The system first calculates the friendship score based on similar behavior using physical context. Secondly, the method computes friendship score with friend relation in the friendship graph using social context. Finally, it combines all of the friendship scores and then recommends friends by the scoring values.

#### *2.1.3 Easy Tracker [3]*

With the help of Easy Tracker, system automates the process of route map and schedule creation, cost and required user input .A transit agency can implement bus-tracking and arrival time prediction system by simply purchasing a number of smartphones and downloading the bus-tracking app to each phone. The system is able to adjust the published routes and schedules in response to road construction or predictable congestion events.

## III. LIFE STYLE EXTRACTION

### *3.1 Life Style Modelling*

Life style and activities are the major contributors in modeling the daily life of a person. Here, Daily life is a mixture of life styles and a Life style can be viewed as a mixture of activities. This is similar to the documents being modeled as a mixture of topics and topics as a mixture of words. An analogy can be established between daily life and document, life style and topic, activity and word. So in our system, daily life of a user is modeled as a life document, life styles as topics and activities as words.

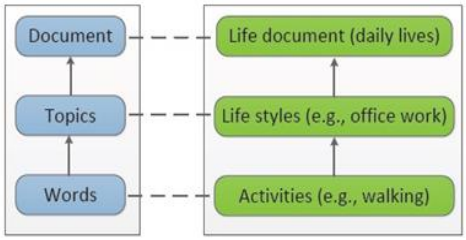


Fig. 1: An analogy between word documents and people's daily lives.

We can find out the probabilities of the topics (life styles) if the life document (daily life) is given using probabilistic topic model. In this we are going to measure the frequency of a word (activity) in a life style. For this a table of activities will be maintained to organize the information obtained from the raw data from sensors. Each user has this table of activities which contains the activity name viz. walking, sitting, driving etc. and the frequency associated with it.

Assume w is a set of activities where $w = [w1, w2, w3, \ldots, wW]$, Here W is total no. of activities. Let z be a set of life styles where $z = [z1, z2, z3, \ldots, zZ]$, Z is the total no. of life styles. Let d be a set of life documents, $d = [d1, d2, d3, \ldots, dn]$ where n is the total number of users. Now using probabilistic topic model, we can find out the probability of activities (words) in a daily life (document).

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### *3.2 Activity Recognition*

In our system, we are going to use motion sensors like accelerometer, gyroscope and various other sensors like camera, microphone, GPS etc. The data obtained from these sensors is always noisy. Hence it needs to be processed to obtain some information from it so that we could use it to recognize the activities of a user. Various filters and techniques are used to improve the recognition accuracy. In case of ambiguity, the user will be prompted to enter the activity he/she is performing.

 

### *3.3 Friend Matching Graph*

Our system recommends friends to a user based on the similarity between their lifestyles. For this purpose, a friend matching graph is constructed. Every vertex of a friend matching graph represents a user and the weight on every edge between two users represents the similarity between their life styles.

It is an undirected graph $G = (V, E, W)$, where $V = \{v1, v2, v3, \dots, vn\}$ is a set of n users.

$E = \{e(i, j)\}$ Is the set of links between the users and W is the set of weights associated with each link. The weight of the edge is represented by the similarity, that is,

$w(i, j) = S(i, j)$

Sthr is a predefined threshold value. If the similarity between query user and any other user exceed the Sthr then system will recommend that friend to the query user.

### *3.4 Algorithm:*

Friend recommendation

Input: The query user I, the recommendation coefficient β and the required number of recommended friends from the system p.

Output: Friend list Fi.

1: Fi ←Ø, Q ←Ø.
2: extracts i's life style vector Li using the LDA algorithm.
3: for each life style zk the probability of which in Li is not zero do
4: put users in the entry of zk into Q
5: end for
6: for each user j / Є Q do
7: S(i,j) ← 0
8: end for
9: for each user j in the database do
10: $Ri(j) = \beta S(i, j) + (1 - \beta)rjk$
11: end for
12: sort all users in decreasing order according to Ri(j)
13: put the top p users in the sorted list to Fi

## IV. FEEDBACK CONTROL

For optimization of performance, feedback control mechanism is included into the system. Feedback is given by user. Feedback can be in the form of query or statement. Feedback is generated by the system and it is analysis on the basis of another user's feedback. In other words one feedback is compared with the other.

In this, feedback is for reducing the ambiguity of user's activity. Sometimes system cannot recognize the exact activity is performing by the user. So for that system can query that what kind of activity is performing by user? Then user can respond as feedback to the system. By this system can get exact activity. System stores such kind of feedback and when in future, such kind of activity is occurs then system directly considers the activity and increases its frequency.

## V. CONCLUSION

Long time ago, people usually made friends with others on the basis of their geo-graphical locations such as people working in their once or living in their neighborhood. The emergence of various social networking sites has given a revolutionary approach of making friends. There are various ways to group people or become friends with somebody on social networks. People can easily make friend on the social networks. But some time recommendation is not as per user's consideration. Most of the time, habits or life style is the most prominent factor between two users friendship but is not widely used by most of the social networks recommendation systems. This is because user's life style is difficult to capture through web actions. So by considering this, we are attempting to use a handy tool like mobile phone to capture and model user's lifestyle and recommend friends on the basis of similarity between two users life style. Most of the time user's lifestyle is based on the activities that performed in their daily life. Our daily life is characterized by numerous activities. This recommendation system allows users to share their lifestyle along the social network. On the basis of this lifestyle system recommends the appropriate friend to the user. Which surely helps user to find there friend on the social network.

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