LINKZONE SOCIAL NETWORKING RECOMMENDER SYSTEM

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ABSTRACT
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 Linkzone, 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, Linkzone 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, Linkzone returns a list of people with highest recommendation scores to the query user. Finally, Linkzone integrates a feedback mechanism to further improve the recommendation accuracy.
KEYWORDS*:* social networking, semantic, recommendation, Linkzone

I. 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 friendselection in real life. In this paper, we present Linkzone, a web services for social network, which recommends friends to users based on their life styles instead of social graphs. By taking advantage of sensor-rich smartphones, Linkzone 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, Linkzone returns a list of people with highestrecommendation scores to the query. Finally, Linkzone integrates a feedback mechanism to further improve the recommendation accuracy. We have implemented Linkzone 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 references 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 she/he lands up with thousands of result. As a result, she/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 earlydays, 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, she/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]. Arecommender system is a personalization system that helps users to find items of interest based on their preferences. Recommender systems are efficienttools that overcome the information overload problem by providing users with the most relevant contents. 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 behavior. 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.

II. MATHEMATICAL MODEL

Let S is the Whole System Consists:
S= {U, w, z, d, Q, F, L,}.
Where,

1. U is the set of number of users.
   U= {u1,u2,........,un}.
2. Q is the set of query generated from user.
   Q= {q1,q2,.........,qn}.
3. F is the set of feedback of users.
   F= {f1,f2,......... ,fn}.
4. Let w is the set of activities
   w= [w1,w2,…….,wW]
   wherewi is the I th activity and W is the total number of activities.
5. Let z is the set of life styles
   z = [z1, z2,……,zZ]
   wherezi is the I th life style and Z is the total number of life styles.
6. Let d is the set of life documents
   d = [d1, d2,…….dn]
   where di is the ith life document and n is the total number of users.
7. Let p(wi|dk) is the probability of the activity wi in a certain life document dk.
8. Let p(wi|zj) is the probability of how much the activity wi contributes to the life style zj.
9. Let p(zi |dk) is the probability of the life style zj embedded in the life document dk.
10. So according to the probabilistic topic model, we have

$$p(w_i|d_k) = \sum_{j=1}^{Z} p(w_i|z_j)p(z_j|d_k)$$

Let Li = [p(z1|di) , p(z2|di),……., p(zZ|di)] and

Lj = [p(z1|dj), p(z2|dj),……, p(zZ|dj)] are set of the life style vectors of user i and user j, respectively.

The similarity of life styles between user i and user j, denoted by S(i, j), is defined
as follows:

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

$$S(i,j) = S_c(i,j) \cdot S_d(i,j)$$

Where, Sc(i, j) is used to measure the similarity of the life style vectors of users as a whole,
Sd(i, j) is used to emphasize the similarity of users on their dominant life styles.

We adopt the commonly used cosine similarity metric v for Sc(i, j), that is,

$$S_c(i,j) = \cos(\mathbf{L}_i, \mathbf{L}_j)$$

Sc(i,j) = cos(Li, Lj)
Friend-matching graph:
It is a weighted undirected graph, G = (V,E,W),
Where,
V = {v1,v2, …..vn} is the set of users and n is the number of users
E = {e(i, j)} is the set of links between users, and

$$E = \{e(i,j)\}$$

W : E→R is the set of weights of edges.
There is an edge e(i,j) linking user i and user j if and only if their similarity

$$S(i,j) \geq S_{thr}$$

S(i,j) >= Sthr
Where, Sthr is the predefined similarity threshold. The weight of that edge is represented by the similarity,

$$\omega(i,j) = S(i,j)$$

W(i,j) = S(i,j)
We use the following representation to convert the graph into a matrix representation,

$$\mathbf{N} = (N_{ij})_{n\times n} = \begin{bmatrix} 0 & \omega(1,2) & \cdots & \omega(1,n) \\ \omega(2,1) & 0 & \cdots & \omega(2,n) \\ \vdots & \vdots & \ddots & \vdots \\ \omega(n,1) & \omega(n,2) & \cdots & 0 \end{bmatrix}$$

III. SYSTEM ARCHITECTURE

Existing System:

- Most of the friend suggestions mechanism relies on pre-existing user relationships to pick friend candidates like friend of friend.
- Facebook relies on a social link analysis among those who already share common friends i.e. mutual friend and recommends symmetrical users as potential friends. The rules to group people together include:
  Habits or life style
  Attitudes
  Tastes
  Moral standards
  Economic level; and People they already know.

Disadvantages Of Existing System

- 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

Proposed System

- A web services for social networks, which recommends friends to users based on their life styles instead of social graphs.
- 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.
- Similarity metric to measure the similarity of life styles between users, and calculate users'

Advantages Of Proposed System

- Recommendeds potential friends to users if they share similar life styles.
- The feedback mechanism allows us to measure the satisfaction of users, by providing a user interface that allows the user to rate the friend list

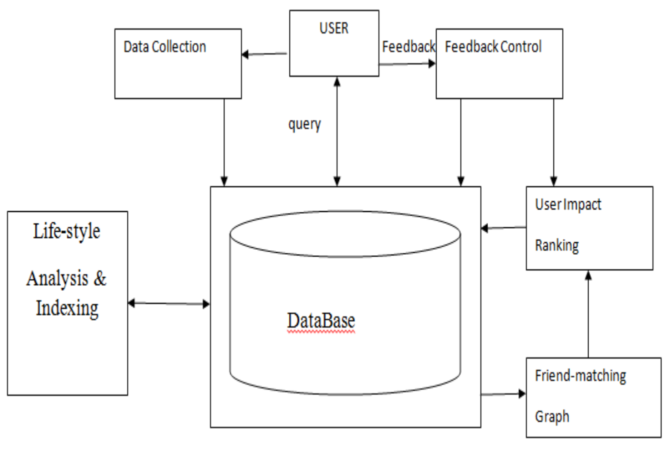

Fig 2. System Architecture

IV. PROPOSED WORK

The proposed system contains the following modules:

1. Face recognition
2. Language Processing and Storage

To recognize the unique feature of the face, the system recognizes the basic pixels and creates the base feature of the face. Further a similar possible image of the face is created using this base feature and the image is classified under various folders. The image data previously stored is compared and the contents from the image are detected and conclusions are made and conversation is done accordingly.

Eigen face algorithm has been used to implement face recognition. If the face is recognized, user is greeted by his name. New users are registered by taking a snapshot of their face and storing it for further interactions. Human and robot interact with the help of speech recognition and

language processing. Human responses from all the chats are stored and the database keeps growing with every interaction. Sentences are processed to find out its object and a dictionary made in MySQL is used to store all the words and its related part of speech, example: eat-verb, chair-noun, beautiful-adjective, etc. Since the database grows with every interaction, the robot's accuracy and aptness increases with it.

The AI perceived human speech in real time. A speech recognition software (Dragon naturally speaking from nuance, LLC) was first applied to convert speech into text. Next, a 10-second temporal window was used to define a local context. Spoken utterances within a context were then compared to spot frequent words that were further processed in two specific ways. First, frequent words were selected as candidate words for object names and would be linked with visual input to compute word-object associations. Second, frequent words were added to a word list that the AI maintained to keep track of those words that the robot heard before. In speech production, the AI would selectively produce those words. In a way, this mechanism made the AI like a copycat – repeating what it just heard most frequently in the recent past. For example, if a human teacher happened to say "hello" to the AI in multiple times, the AI would say "hello" back to the human teacher. Thus, the AI learning system was transparent and straightforward purely driven by statistical regularities in the data without complicated inference. The goal was to show how better data from interaction may lead to better statistical learning.

V. CONCLUSION AND FUTURE SCOPE

In this paper, we designed the Linkzone, a web services for social network. It is Different from the other friend recommendation mechanisms relying on social graphs in existing social networking services, where as this Friendbook extracted life styles from user-centric data collected from sensors on the Smartphone and recommended potential friends to users if they share similar life styles. We implemented Friendbook on the Android-based Smartphone's, and evaluated its performance on both small scale experiments and large-scale simulations. The results showed that the recommendations accurately reflect the preferences of users in choosing friends. Beyond the current prototype, the future work can be four-fold. First, we would like to evaluate our system on large-scale field experiments. Second, we intend to implement the life style extraction using LDA and the iterative matrix-vector multiplication method in user impact ranking incrementally, so that Friendbook would be scalable to large-scale systems. Third, the similarity threshold used for the friend-matching graph is fixed in our current prototype of Friendbook. It would be interesting to explore the adaption of the threshold for each edge and see whether it can better represent the similarity relationship on the friend-matching graph. At last, we plan to incorporate more sensors on the mobile phones into the system and also utilize the information from wearable equipments (e.g., Fitbit, iwatch, Google glass, Nike+, and Galaxy Gear) to discover more interesting and meaningful life styles.

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