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# AN EFFICIENT METHOD FOR FRIEND RECOMMENDATION ON SOCIAL NETWORKS

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***Abstract*** **-** *Existing social networking services recommend friends to users based on their social graphs, geographical location. The proposed design will be present FriendSeeker, a new recommendation system for social networks, which suggests friends to users based on their life styles instead of social graphs. FriendSeeker discovers life styles of users from personal interest and measures the relationship of life styles between users, and suggest friends to users if their life styles have high match. The proposed design will develop a general friend recommendation system by using Latent Dirichlet Allocation (LDA) algorithm and friends suggest will be given to the user. Then propose a similarity metric to determine the similarity of life styles between users, and compute users' impact in terms of life styles with a friend-matching graph. Upon receiving a request, FriendSeeker returns a list of people with maximum recommendation scores to the query user. Finally the proposed designs will implement on the Android-based System or Smartphone's. The results will show that the recommendations accurately return the preferences of users in choosing friends.*

***Key Words***: **Recommend friends, Latent Dirichlet Allocation (LDA) algorithm, friend-matching graph, recommendation scores, similarity metrics**

## 1. INTRODUCTION

Existing social networking services recommend friends to users based on their social graphs, geographical location. 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 [1] recommends items to a user based on items the user previously visited, and items that other users are looking at. Netflix [2] and Rotten Tomatoes [3] recommend movies to a user based on the user's previous ratings and watching habits. The proposed design will be present a new recommendation system for social networks, which suggests friends to users based on their life styles instead of social graphs. The system discovers life styles of users from personal interest and measures the relationship of life styles between users, and suggests friends to users if their life styles have high match. The proposed design will develop a general friend recommendation system by using Latent Dirichlet Allocation (LDA) algorithm and friends suggest will be given to the user [4]. Then propose a similarity metric to determine the similarity of life styles between users, and compute users' impact in terms of life styles with a friend-matching graph. Upon receiving a request, system returns a list of people with maximum recommendation scores to the query user. Finally the proposed designs will implement on the Android-based System or Smartphone's. The results will show that the recommendations accurately return the preferences of users in choosing friends. Social networking services (SNSs) provide a platform where likeminded people interact and express opinions. A social networking service is an online service that focuses on building social relation or network among people who, for example, share interests, activities, backgrounds or real-life connections. Recommendation systems that try to suggest items (e.g., music, movie, and books) to users have become more and more popular in recent years.

A social network contains representation of each user, the profile as it is generally known consists of information about the person, and his/her social links and an array of activities or personalities followed by the user. Twenty years ago, people typically made friends with others who live or work close to themselves, such as neighbors or colleagues. We call friends made through this traditional fashion as G-friends, which stands for geographical location-based friends because they are influenced by the geographical distances between each other [5]. With the rapid advances in social networks, services such as Facebook, Twitter and Google+

have provided us revolutionary ways of making friends. According to Facebook statistics, a user has an average of 130 friends, perhaps larger than any other time in history [6]. 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. We present a system, a novel semantic-based friend recommendation system for social networks, which recommends friends to users based on their life styles instead of social graphs. In proposed system, recommending friends will be given to users not only on geographical location but also on life style, personal recommendation system by using Latent Dirichlet Allocation (LDA) algorithm. So, better and optimize friend recommendation list will given to the user.

According to these studies, the rules to group people together include: 1) habits or life style; 2) attitudes; 3) tastes; and 4) people they already know. Apparently, rule #3 and rule #4 are the mainstream factors considered by existing recommendation systems. Rule #1, although probably the most intuitive, is not widely used because users' life styles are difficult, if not impossible, to capture through web actions. Rather, life styles are usually closely correlated with daily routines and activities. Therefore, if we could gather information on users' daily routines and activities, we can exploit rule #1 and recommend friends to people based on their similar life styles. This recommendation mechanism can be deployed as a standalone app on Smartphone or as an add-on to existing social network frameworks. In both cases, proposed system can help mobile phone users find friends either among strangers or within a certain group as long as they share similar life styles.

- To the best of our knowledge, proposed system is the first friend recommendation system exploiting a user's life style information.
- Inspired by achievements in the field of text mining, we model the daily lives of users as life documents and use the probabilistic topic model to extract life style information of users.
- We propose a unique similarity metric to characterize the similarity of users in terms of life styles and then construct a friend-matching graph to recommend friends to users based on their life styles.
- We integrate a linear feedback mechanism that exploits the user's feedback to improve recommendation accuracy.

## 2. LITERATURE REVIEW & RELATED WORK

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 [1] 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] recommend movies 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. Meanwhile, other recommendation mechanisms have also been proposed by researchers.

Bian and Holtzman [8] presented MatchMaker, a collaborative filtering friend recommendation system based on personality matching. MatchMaker aims to tackle problem by going in the reverse direction: in order to encourage more TV viewing, instead of recommending a user to watch the shows that his social network friends have watched, MatchMaker recommends him to become friends with someone whose matching TV character is friend with the user's matching TV character.

Gou et al. [11] proposed a visual system, SFViz, to support users to explore and find friends interactively under the context of interest, and reported a case study using the system to explore the recommendation of friends based on people's tagging behaviours in a music community. In this approach, recommendation is purely based on how people are currently connected and whether friends of existing friends of a person can be new friends of the person. Recommendation can also include non-topological information. For example, one method is to use a user's profile, such as education and professional background, to make recommendation. While this method can enhance recommendation performance, it largely focuses on static information, and overlooks changing interests of user. In this a novel approach to support users to explore and find friends interactively with different interests is introduced.

Hsu et al. [12] studied the problem of link recommendation in weblogs and similar social networks, and proposed an approach based on collaborative recommendation using the link structure of a social network and content based recommendation using mutual declared interests. This paper presents a recommender system for links in a social network. Such links have different meanings depending on the start and end points: between users of a weblog service denote friendship or trust; between users and communities, they denote subscribership and requested privileges such as posting access; between communities and users they denote accepted members and moderator privileges. Specific recommendation targets for weblogs include links (new friends and subscriberships), security levels (link strength), requests for reciprocal links (trust, membership and

moderatorship applications), and definition of security levels (filters). There are analogous applicatons of this functionality in social networks such as citation and collaboration networks. This approach uses graph feature analysis to recommend links given structural features of individual vertices and joint features of the start and end points of a candidate link, such as distance between them.

Kwon and Kim [13] proposed a friend recommendation method using physical and social context.. The scheme considers friendship from similar physical context. Moreover, our scheme considers explicit friendship using social context such as the social network. And then, the scheme combines both the friendship using physical context and it using social context. The main idea of the proposed method is consisted of the following three stages; Firstly, our method computes the friendship score based on similar behaviour using physical context. In the computation, we adopt the traditional information retrieval method, BM25 weighting scheme. Secondly, the method computes friendship score with friend relation in the friendship graph using social context. Finally, combine the all of the friendship scores and then recommend friends by the scoring values.

Yu et al. [14] recommended geographically related friends in social network by combining GPS information and social network structure. Propose a geo-friend recommendation problem, and discuss the differences from previously studied link prediction problem. Define and generate a set of GPS patterns to describe people's real life social interaction and correlation. Propose a random walk-based statistical framework for geo-friend recommendation

## 3. PROPOSED WORK

In proposed system recommending friends will be given to users not only on geographical location but also on life style, personal recommendation system by using Latent Dirichlet Allocation (LDA) algorithm. So, better and optimize friend recommendation list will given to the user. In this paper we propose a method for:
Finding out the interest of people and recommending him/her friend based on interest in social networking site. Our framework consists of two main processes:

- Development of a web application
- Development & Implementation of a LDA model to find the user with similar interest and recommend friend to user.

### 3.1 Development of web application:

This step involves creation of web application on the client side using Php. For a web application, we will be providing a URL for the user to search the web page. Later a login page is created through which user logs into our application i.e. Friendseeker.

### 3.2 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. 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. The probabilistic topic model can be given as,

$$Score_{12}=J.D.\ [P_{U1}, P_{U2}]$$

Where $P_{U1}$ denotes the first name, last name, location, posts, comments of first user.
Then count of these activities can be accessed based on the permission given by 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. let us define this threshold as α(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.
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 than some specified threshold value, we have assumed Threshold value. Let's consider this recommending threshold as β(beta). In the proposed work, we have focused on some important phases as below

a. ***Creating a user interface application for login*:** Web applications that require authorization to access certain information. Your login page verifies a user's name and password, places a cookie on the user's computer so he can return later, and uses database queries to retrieve the personal information for the user.
b. ***Extracting user data and storing in database*:** We use Graph API tools for

extracting data. The advantages of Graph API over previous work are the ability to learn highly accurate extraction rules, and then we store this user information like 'name', 'email', likes, in the database that we have created.

c. ***Finding similarity between 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.

d. ***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).

## 4. PLAN OF PROJECT WORK

- **Phase 1.**
  1. Literature Survey
  2. Analysis of literature data

- **Phase 2:**

1. Development of a social network web application
2. Analysis of profile

- **Phase 3:**

1. Friend recommendation system
2. Optimization of friend recommendation system base on user query
3. Result analysis and comparison

- Conclusion
- Preparation of Project Report

## 5. CONCLUSION

In this approach we presented the design and implementation of Friendseeker, a semantic-based friend recommendation system for social networks. Different from the friend recommendation mechanisms relying on social graphs in existing social networking services, the results showed that the recommendations accurately reflect the preferences of users in choosing friends. Friendseeker can utilize more information for life discovery, which should improve the recommendation experience.

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