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A Review of Friend Recommendation on Social Media

M.Tech. Scholar Atul Kumar Churhe, Asst. Prof. Girish Gogate
Department of Computer Science and Engineering
Rishiraj Institute of Technology (RIT),
Indore, India
atulchurhe@gmail.com, girishgogatee@mail.com

Abstract- Friend suggestion is one of the most popular elements of social network platforms, which suggests similar or known individuals to users. The notion of friend referral derives from social networks such as Twitter and Facebook, which employs friends-of-friends approach to suggest individuals. We may argue users do not create friends from random individuals but end up becoming friends with their friends' pals. The previous approaches have restricted scope of suggestion and are less efficient. We propose a new buddy recommendation model to alleviate the drawbacks of present system. For improved buddy recommendation system with high accuracy, we will use collaborative filtering approach to compare similar, dissimilar data of users and will develop a recommendation system which delivers user to user suggestion based on their comparable choices, activities and preferences. Location based friend recommendation system are getting popular since it integrates actual world to digital platform and delivers greater insight into user's preferences or interest This recommendation system will broaden the breadth of suggestion from one user to other with similar set of interest and their area.

Keywords- Friend Recommendation, Collaborative Filtering, Social Network, Recommendation System.

I. INTRODUCTION

Friend recommendation is one of the most common and fundamental service in LSBN platform which recommends familiar or interested user to each other. By 2017, 71% of internet users were social network users and they are expected to grow in near future. Social networking is the most popular online activities with high user engagement rate and expanding mobile possibilities. The rapid growth in use of smart phones and mobile devices has opened up the possibilities of mobile social networks with increased features.

With over 1.86 billion monthly active users, social network Face book is currently the market leader in terms of user engagement reach and scope. Recent advances in localization techniques have improved social networking services, allowing users to share their locations and location-related contents. Such type of social networks is referred as location-based social networks (LBSNs).

The objective of our proposed recommendation systems is to include user profiles, interest, and user location histories and apply collaborative filtering methods for user to user recommendation to increases scope of recommendation and make it more efficient.

1. Recommender Systems:

A Recommender system is an information filtering system that predicts preference a user would give to something. With more use of e-commerce sites, it has become very easy for the users to find the items of their interest without wasting a lot of time. Websites like Amazon and E bay examples for Recommender systems which provide recommendations to the users based on their search history and purchase history. Recommender systems provide recommendations of almost all the items ranging from books to movies to music. Face Book and Twitter are also recommender sites which provide recommendations for friends. NetFlix.com is very famous as a movie recommender website.

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Yahoo News and Google news are very famous for news.

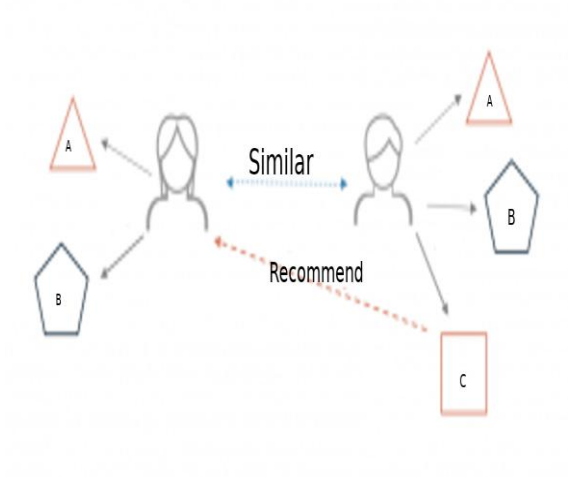

Fig 1. Recommender System.

2. Collaborative Filtering:

Collaborative filtering is a technique to collect and analyze a large amount of information about user's activities or preferences and predicting what users will prefer based on their similarity to other users. The intension behind Collaborative filtering is that people who agreed in the past will agree in the future, and that they will like similar kinds of items as they liked in the past. The recommender system compares the data of different users and calculates a list of recommended items or user.

One examples of collaborative filtering is item-to-item collaborative filtering people who buy x then they will also buy y. Facebook, MySpace, LinkedIn, and other social networks use collaborative filtering to recommend new friends and groups by examining the network of connections between a user and their friends.

Two of the main collaborative filtering types are user based & friend-based collaborative filtering approaches. We will talk of User based collaborative filtering only. User-based collaborative filtering takes the users with similar choice or score. The main task of this algorithm is to find the best user set for the chosen user to suggest new friends with the greatest similarities with the chosen user [7].

To find the similarity or degree of correlation between users. a weighted average of the recommendations of several users can be found. The weight age to user's choice would be found by degree of correlation between the two users.

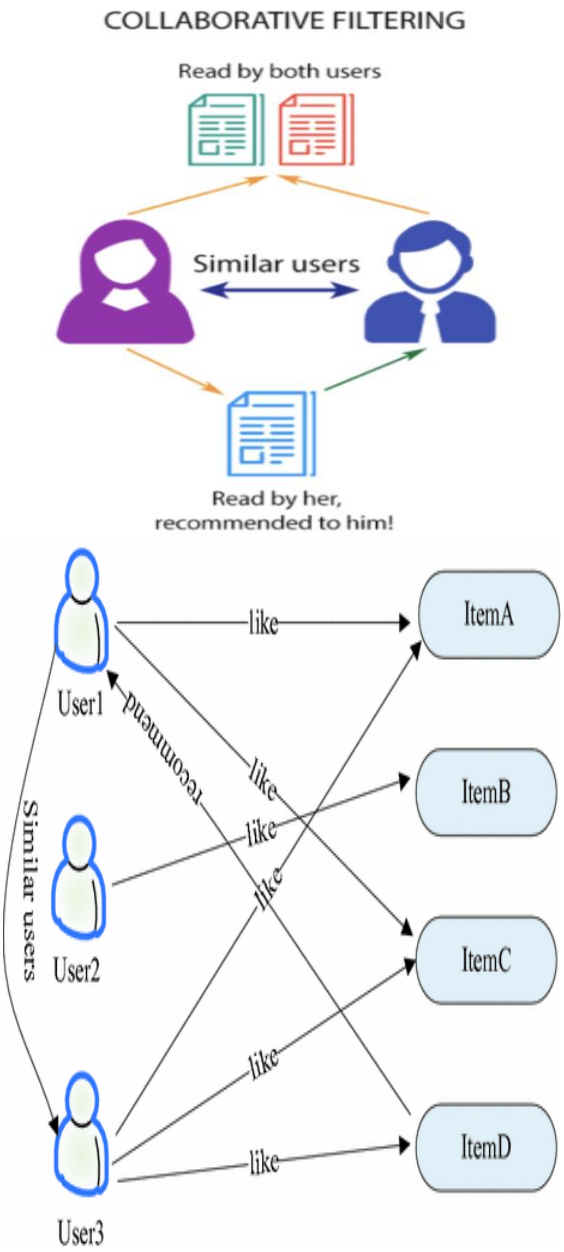

Fig 2. Collaborative Filtering.

The most common measure of correlation is the Pearson Product it is designated by the letter "r" and is sometimes called "Pearson's r". It reflects the degree of linear relationship between two variables and ranges from +1 to -1.

A correlation value of +1 means that it is a perfect positive relation among users.

$$r = \frac{\sum_{i=1}^{n}(x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum_{i=1}^{n}(x_i - \bar{x})^2 \sum_{i=1}^{n}(y_i - \bar{y})^2}}$$

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II. LITERATURE SURVEY

A new friend recommendation model (FE-ELM), is proposed where friend recommendation is regarded as a binary classification problem. In this model first feature extraction is done by using different strategies and then in training process ELM is selected as classifier to learn the spatial-temporal feature, social feature, and textual feature, finally experiments are performed on real datasets for better efficiency and accuracy [2].

Authors after evaluating and comparing of five types of recommenders: a people-based recommender, a tags-based recommender, two types of a hybrid recommender (PTBR): a combination of people or tags (or-PTBR) and a (and-PTBR, suggesting only items related to both people and tag and a popularity-based recommender (POPBR). found that combining both related tags and people in the user profile does not significantly increase the interest in recommended items over a pure tag-based approach but it also lowers the percentage of already known items, increases the diversity of item types [3]. The new properties and challenges that location brings to recommender systems for LBSNs are discussed in this paper.

First, author has categorized the recommender systems by the objective of the recommendation, which include locations, users, activities, or social media. Second, they categorize the by the methodologies employed, including content-based, link analysis-based, and collaborative filtering. Third, categorize the systems by the data sources used, including user profiles, user online histories, and user location histories. For each category, the goals and contributions of each system are summarized and highlight the representative research effort. It introduces the concepts, unique properties, challenges, evaluation methods and future work for recommender systems in LBSNs [4].

Hierarchical-graph-based similarity measurement (HGSM) framework is proposed here, which models people's location histories and determines the similarity between users. In this framework, 3 factors sequence property of users' movements, Hierarchy property of geographic spaces, Popularity of different locations are considered. Using HGSM to estimate the similarity between users, a collaborative filtering-based method is also employed in our system to find an individual's interest in unvisited geospatial regions [5].

A friend recommendation algorithm is proposed which is known as Random walk-based context-aware friend recommendation algorithm (RWCFR). This model uses an undirected un-weighted graph that represents users, locations, and their relationships.

RWCFR constructs a sub-graph according to the current context of the user. Local experts and popular locations in region are added to this sub-graph. After constructing the sub-graph, this sub-graph is given as input to our random walk algorithm, and it calculates the recommendation probabilities of users for friend recommendation. A list of potential friends is provided to user according to output of the random walk algorithm [6].

Recommendation system make use of user profile, item description and past behavior for recommendation but no emphasis has been given on personalization based explicitly on social networks. This paper uses dataset from the last.fm social network that describes a social graph among users, tracks and tags, effectively including bonds of friendship and collaborative annotation. Experiments are performed between the Random Walk with Restarts model and a user-based collaborative filtering method using the Pearson Correlation similarity on this dataset. The results show that the graph model system benefits from the additional information embedded in social knowledge [7].

The paper analyzes the main challenges of the collaborative filtering algorithm and provides several solutions. To solve cold start problem for the new user, we could replenish user's profile indifferent ways, the general approach is to require user provide their profile while login the social account and for the new item, we could combine the collaborative filtering and content-based recommender algorithm. There are few solutions for the scarcity problem. The first one uses filling or decreasing the dimension to decrease the sparsity of the matrix. Another solution improves the efficiency of the algorithms without changing the sparsity of the matrix. [8].

Author through analysis on a dataset collected from Foursquare; observe that there exist strong social and geo-spatial ties among users and their favorite

locations in the system. So, a friend-based collaborative filtering approach is developed for location recommendation based on ratings of places. Additionally, *Geo-Measured* FCF (GM-FCF) based on heuristics derived from observed geospatial characteristics in the foursquare dataset. Evaluation is done to validate proposal and make comparison between the collaborative filtering (CF), social collaborative filtering (SCF) and random walk and restart (RWR) [9].

Temporal, spatial and social correlation is three main attributes of any LBSN. However, the situation which includes these three features cannot be solved in previous algorithms. There is no method which utilizes all information properly A new approach of friend recommendation is proposed, which aims to recommend friends with similar location preference for LBSN's users.

This approach first, use the method of local random walk based on Markov chain to calculate the user's friendship similarity on social network. Second, it calculates the user's location preference similarity in the real world based on check-in data and finally recommends friends to users by building a mixed user preferences model [10].

LBSN is a new social networking platform for making friends, sharing information, searching contents with the location enabled data but it has increased concern for privacy protection, friend recommendation etc. In this paper SVM based approach for friendship prediction on LBSN is proposed in these model user social relations, check-in distance and check-in type are extracted, information gain is calculated and prediction model is established [11].

Author proposes a deep pair wise learning model, namely FDPL. Our model first learns the low dimensional latent embeddings of users' social relationships by jointly factorizing them with the available contextual information based on a multi-view learning strategy. In addition, to account for the fact that the contextual information is non-linearly correlated with users' social relationships we design a deep pair wise learning architecture based on a Bayesian personalized ranking strategy.

We learn the non-linear deep representations of the computed low dimensional latent embeddings by formulating the top-k friend recommendation task at location based social networks as a ranking task in our deep pair wise learning strategy.

Our experiments on three real world location based social networks from Brightkite, Gowalla and Foursquare show that the proposed FDPL model significantly outperforms other state-of-the-art methods. Finally, we evaluate the impact of contextual information on our model and we experimentally show that it is a key factor to boost the friend recommendation accuracy at location-based social networks [12].

Author propose a Friend Recommendation system for social networks which will be measure the frequency of user activities and update the dataset according to the frequency and intensity of their activities. We will be using the K-Nearest Neighbor algorithm; we can easily classify the user activity and behaviors with some criteria. We also build a user's daily life journal, from which their life preferences are extracted by using the K-Nearest Neighbors with threshold algorithm.

We use a similar method to calculate the similarity of life styles or preference between users, and determine users' impact in terms of interests with a public-private graph. We have implemented the Friend Recommendation system, and evaluated its performance on both small-scale experiments and large-scale simulations. The results show that the recommendations reflect the users 'preferences in choosing friends [13].

III. PROBLEM STATEMENT

The existing system of recommendation used by social media websites are inefficient as they make use of content-based filtering and even if they use collaborative approach the scope is limited because they are based on friend of friend's concept.

Many users do not find recommendation made by existing system helpful as they do not know a person or they might not have similar interest, it leads to less interaction over social network among different users which is not beneficial for social network websites as user do not spend much time on site.

If user do not find new people and spend less time on social network platform then it is a sign of worry

for them therefore, we need to recommend new people to users for similar interest.

IV. RESEARCH GAPS

- A location shared by two users could be evidence of similarity or it could also indicate location is popular so more attributes need to taken into account before generating recommendation to find proper connection between users.
- Most LBSN recommendation system suggests locations to user but not friends with similar interest.
- If two users are same in social structure and has overlapped location history there is chance that can become friend.

V. CONCLUSION

We propose a method for recommending friends on social media platforms based on user's profile data, check in activities, interest etc. A recommender based on comparing one user check in activities, location or interest with other yields better recommendation results that are significantly more relevant to the user than the friend of friend's-based system. The proposed system will increase the scope of recommendation. All social media websites use the recommendation system.

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