ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 4, Issue 9, September 2016

Recommendation Problem Solving Using Social Factors and User Locations

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ABSTRACT: Continuous growth of information produced by online social networks leads to increase in demand of effective recommendation systems to give more precise and accurate results. Traditional techniques of recommendation become unqualified because they do not consider data of social relation in the social network for giving recommendation; existing social recommendation techniques only consider social network structure, but social perspective has not been fully measured by these recommendation techniques. It is notable and challenging to fuse social contextual factors which are derived from user's motivation of social activities into social recommendation. With the popularity of social networking, ever more users like to share their real life experiences on social sites, such as blogs, ratings and reviews. New aspects of social networking like interpersonal influence and interest based on circles of friends carry opportunities as well as challenges for recommender system (RS) to resolve the cold start and sparsity problem of data sets. Some of the social factors have been used in Recommendation Systems; but still they have not been fully measured. This system moves one step further to interpret accurate recommendations.This system uses main three social aspects, User personal interest, interpersonal interest similarity, as well as interpersonal influence, and these factors are fused into a combined personalized recommendation model and after this results obtained are Combined together and filtration process is performed to give accurate and relevant recommendations to the user.

KEYWORDS: Interpersonal Influence, Personal Interest, Recommender System, Social Networks, Contextual Recommendation, User Interest Factor

I. INTRODUCTION

The new factors of social network like interpersonal influence and interestbased on circles of friends bring opportunities and challenges for recommendation system (RS) to solve the cold start and sparsity problem of data sets. Most of the social factors have been used in Recommendation Systems, but have not been fully considered. In this project, three social factors, personal interest, interpersonal interest similarity, and interpersonal influence, fuse into a unified personalized recommendation model in which we have applied Bi-Clustering and fusion technique to give accurate recommendations to user on the basis of user personal interest. Users on social networks generate large volume of information and urge recommendation systems to provide useful results. Traditional techniques typically based on collaborative filtering become unqualified in solving the social recommendation problem because they ignore social relation or interaction data and they have also not considered user location information to give recommendations. besides the experiential suppositions, psychological and sociologicalreadings have proved that individual preference and interpersonal influence affect user's decisions on information adoption. This system demonstrates that the introduction of interpersonal influence into the preference driven decision process makes user behaviors more complex and thus increases the unpredictability of the item adoption. Thus, only when individual preference and interpersonal influence are properly fused into recommendation, the impulsiveness can be reduced and the recommendation performance can be improved accordingly. The system proposes a social contextual recommendation framework based on a probabilistic matrix factorization method to incorporate individual preference and interpersonal influence to improve the accuracy of social recommendation. More specifically, we factorize the user-item interaction matrix into two inter mediated latent matrices: user-item influence matrix and user-item preference matrix, which are generated from three objective latent matrices: user latent feature matrix, item latent feature matrix, and user-user influence matrix. Moreover, as we can partially observe individual preference and interpersonal influencebased on historical

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user-item and user-user interaction data, we further utilize the observed contextual factors to compute the three objective latent matrices.

II. RELATED WORK

The personalized recommendation approach uses three social factors: user personal interest, interpersonal interest similarity, and interpersonal influence to give the recommendations to the user according to his personal interest. Amongst these three factors, user personal interest and interpersonal interest similarity are two important factors which are main contributions of the approach and all are related to user'spersonal interest. Thus, we present user interest factor firstly. And after this, we assume the objective function of the proposed personalized recommendation model [1].

User Interest Factor:

In addition to the trust values between friends, user interest is another significant factor to affect user's decision-making process, which has been proved by psychological and sociological studies. Moreover, Jiang *et al.* [3] demonstrated the effect of ContextMF model with consideration of both individual preference and interpersonal influence. However, there are two main differences of the user interest factor in personalized recommendation model to individual preference in ContextMF [3]:

1) The objectivity of user interest. It means that we can recommend the items based on user personal interest at a certain extent. In additional words, we utilize user's connection with the items to train the latent feature vectors, especially for the experienced users.

2) Interest circle inference. Just like CircleCon model [2], we divide the tested social network into several sub-networks, and each of them resembles to a signal class of items. Bearing in mind the cold start users who has a few rating records, we use friend's interest in t same class to tie user latent feature vector.

Personal Interest:

Due to the uniqueness, specially users with many rating records, users frequentlypick items all by themselves with slight influence by their friends in their social circle. However, many preceding works [2]–[4] acquired the circles of friends in social networks to solve the cold start problem of data. It did work for the cold start users with a few records, but unnoticed the uniqueness for proficient users. In other words, the relevance of user and item hidden feature vector rely on the relevance of user interest *Du* and item topic *Di* to a certain extent.More correctly, we signify the relevance of user *u*'s personal interest to the area of item *i* in our recommendation model by *Qu,i = Sim(Du,Di).*

Thus User Interest Factor contains the succeeding information aroundthe User:

-user interest description
-personal interest
-interest circle inference

Basic Matrix Factorization:

(BaseMF) approach, which does not take any of the social factors into consideration. The task of RS is to reduce the error of foreseen value using ***R*** to the real rating value. Thus, the BaseMF model is trained on the observed rating data by minimizing the objective function [5].

Circle Con Model:

The CircleCon model has been found to outclass BaseMF and SocialMF with respect to accuracy of the RS. The approach centers on the factor of interpersonal trust in social network and concludes the trust circle[3].Procedure:

1] Trust circle inference
2] Trust value assignment
3] Model training

Context MF Model :

The job of ContextMF model is to recommend conventional items from sender *u* to receiver *v*. Here, the factor of interpersonal influence is related to the trust values in CircleCon model[4].

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III. PROPOSED METHODOLOGY

In this system, three social factors:personal interest, interpersonal interest similarity, andinterpersonal influence, fuse into a unified personalized recommendation model by using user location and user personal interest.

The main **contributions** of this project are summarized as follows:
1) The factor of user personal interest makes direct connections between user and item latent feature vectors.
And the two other social factors make connections between user and his/her friends' latent feature vectors.
2) Propose a personalized recommendation approach by enforcing user personal interests, which is category related and represented by a multi-level tree structure.
3) Use of Bi-Clustering and Fusion Method[2] will effectively reduce the cold start problem.
-Personal unique interest is modeled to get an accurate model for the cold start user and user with very few friends and rated items.
The impacts of the three factors to the recommendation performances are systematically compared.proposed model will help to solve the user cold start and sparsity problem[2].
As the main aim of our method is to give accurate recommendations to the users according to user's personal interest, so we will combine user interest and social circle in such a way that, it will give better recommendations than the previous recommendation techniques. So proposed recommendation system will contain following modules:

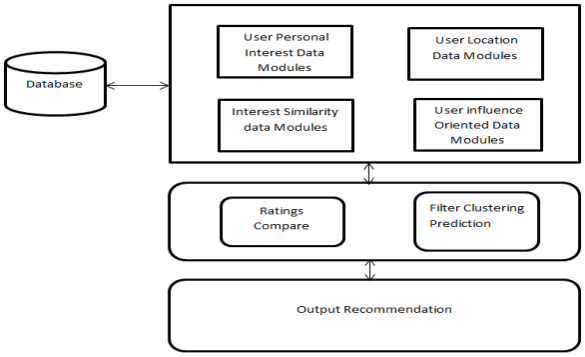

Fig: System Architecture

A. USER INTEREST FACTOR:

User interest factor is considered or taken from user itself i.e. in given project some user interests are specified from which user has to select his personal interest. This user chosen personal interest is recorded in to the database. Similarly user interests of all the users are recorded. This recorded user personal interest is used in this recommendation technique at the time of giving user personalized recommendations to each user. In this system the user personal interest is compared with the other factors such as user interest similarity, user interest influence and results are given to the user in the form of personalized recommendations.
Aim of our system is to give accurate recommendations to the user on the basis of its personal interest. So, in order to give accurate recommendations to the user, we have to find exactly what the user wants. To do this we have to scan/extract the user interest or user query. So for that purpose we have to do the feature extraction. In this user inputs a query to system, the query is stored in to database. And after this the various features are extracted from that query.

B. USER LOCATION DATA:

In this system we will save the user location at the time of sign up i.e. user location is taken from the user when he first time register himself to the system. Once the user location is saved to the database system will use this location to give location based recommendations to the user. System will collect all user's location data and it will be saved in to the database, afterword's user interests of all the users from various locations is compared and recommendations are given to the users having similar interests in that particular location area.

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C. USER INTEREST SIMILARITY

In this, we will take the user preferences of different user and check the similarity between the users having similar interest and user similarity factor is calculated. This interest similarity factor will be used to give the recommendations to the user i.e. items are recommended to the user having personal interest common with the other users who are present in his friends circle.

D. USER INFLUENCE DATA

User influence means impact of a particular user on other user for a particular thing. This user influence data factor is considered at the time of giving the recommendations to the user in this system.

In this system, user personal interest oriented data, user interest similarity oriented data, user location oriented data and user influence oriented data mining process are then combined. And after this particular weight is assigned to these user ratings. And by using this data personalized recommendations are given to the user these are location based recommendations.

After finding the user oriented, user similarity and inter personal influence oriented data, next task is to combine all these data and arrange this data according to similarity with user personal interest and give the recommendations to the users. For this purpose we will use Bi-Clustering and Fusion Technique [2]. The Output of this step will be the output of our proposed system, i.e. personalized Recommendations on the basis of bi-clustering and fusion technique.

In short this recommendation system will give three types of recommendations to the user these are keyword based recommendations; user location based recommendation and personalized recommendations on the basis of bi-clustering and fusion algorithm. By using these techniques given system will overcome the disadvantages of previous systems such as cold start problem and sparsity problem.

IV. PROPOSED ALGORITHM

A. *ALGORITHM FOR PERSONALIZED RECOMMENDATION MODEL:*

1. Initialize RS;
2. Require: 0<l<1,t=0;
3. While (t<N)
   Calculate Probability of users, Items;
4. SearchOptimum l;
5. User latent profile=ULT-l(probability of users)
   Item latent profile=ULT-l(probability of users)
6. Form User/Item Matrix.
7. End

In RS we have,

Set of Users $U=\{U_1 \ldots U_m\}$, Set of items $P=(i_1 \ldots i_N)$
Rating Matrix $R=[R_{u,i}]_{mxn}$ where, $R_{u,i}$ is rating of user U on item I.
In social rating N/W each user U has set of friends

The trust value given in matrix:

$$S=[S_{u,v}]_{mxm}$$

The interest similarity given by matrix

$$W=[W_{u,v}]_{mxm}$$

The relevance value given by matrix:

$$Q=[Q_{u,i}]$$

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The location value given by matrix:

$L=[L_{u,l}]$

In this step the ranks of users are calculated according to their personal interest, interest similarity, interest influence and user location and all these data is combined together and following clustering and filtration technique is applied to find the optimal user rating values. And these values are compared with user personal interest and relevant recommendations are given to the users.

B. ***ALGORITHM BIFU STEPS:***

1. Procedure BiFu
2. Input: An Item and User matrix IU
3. Output: Recommendation for user requirements.
4. Procedure FILTERATION PHASE
5. Filtering Insignificant Ratings in IU
6. Eliminate Empty profiles in IU
7. Making a compact area
8. End procedure
9. Procedure BI-CLUSTERING PHASE
10. bi-clustering
11. Leveling ratings within every item user cluster, correspondingly
12. End procedure
13. Procedure PREDICTION PHASE
14. Guessing unrated items for requests
15. Building recommendations
16. End procedure
17. End procedure

Data obtained from previous steps is combine together and then bi-clustering and fusion technique is applied on it in which first data filtration is performed in that trivial ratings are removed and empty profiles are also removed. In next step data clustering is performed in which remaining data from previous step is combined together. After this prediction phase is there in which user recommendations are predicted.

V. SIMULATION RESULTS

Experimental results shows that accuracy of proposed Social factor and Location based recommendation system gives more relevant and accurate results than existing system. In addition with existing systems social factor data the proposed system also use users location data to give recommendations to the users according to his/her personal interest. So results given by proposed system are better than existing Recommendation System.

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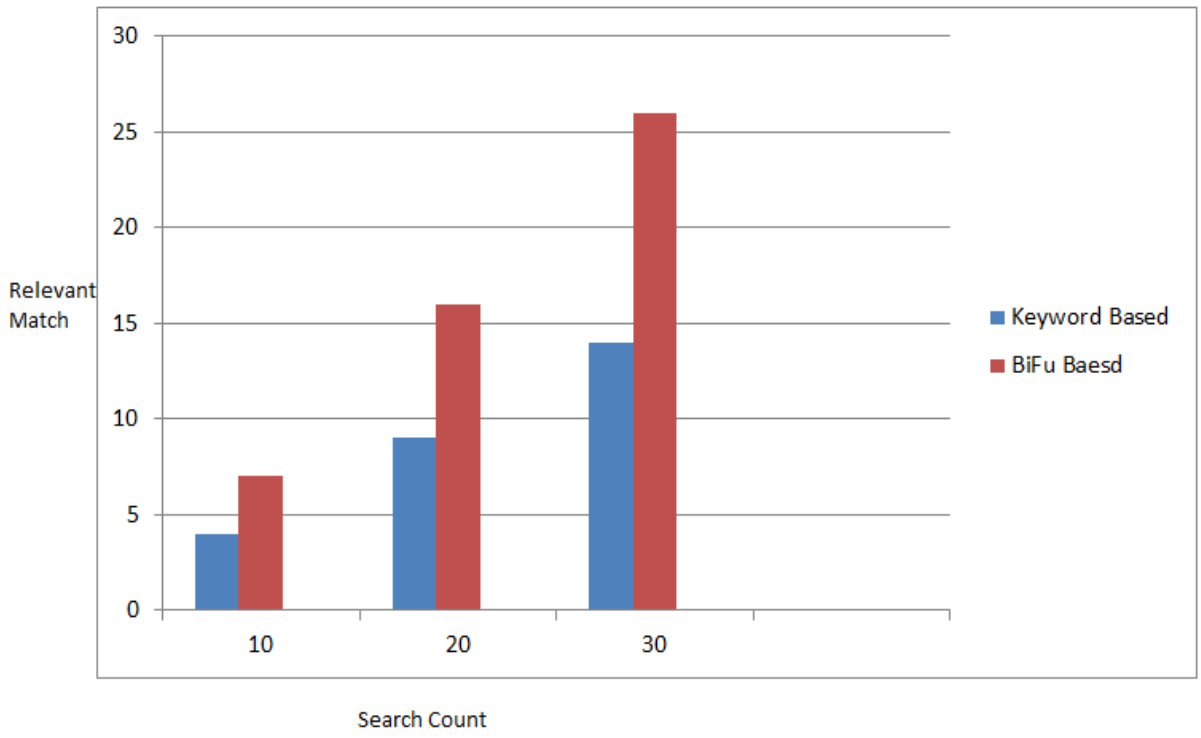

VI. CONCLUSION AND FUTURE WORK

In this project, a new recommendation approach is proposed by using some social network factors like:user personal interest, interpersonal interest similarity, and the interpersonal influence as well as user location information is also considered.After this Filtration, Clustering, Prediction operations performed on social factor data to give the recommendations to the user according to his personal interest.Results given above shows that proposed system overcomes the disadvantages of previous recommendation systems and give the relevant recommendations as per the user's personal interest. This system also reduces the sparsity and cold start problems of data in recommendation systems.

In future work, in these system users dynamic location change functionality can be given so that user will get more appropriate recommendations when user changes his location frequently.

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BIOGRAPHY

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