

SURVEY ON TRUST AWARE RECOMMENDATION

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Abstract: *Now-a-days social networking sites are more and more popular for the communication, networking and content sharing. In the online social networks, social network based recommendation approach is used. In the paper, we study recommendation techniques such as Matrix Factorization (MF) for the Trust Aware Recommendation in Social networks based on the Deep Learning (DL) called as deep learning based matrix factorization (DLMF). Firstly, find out the per-train initial value of the parameter for this using a deep auto-encoder. The community detection algorithm based on trust relations in social networks is proposed for the revamp the MF model with social trust ensemble and community effect. A benefit of such approaches is that the ability of dealing with problems with clod star users.*

Keywords: *Recommendation Techniques, Deep Learning, Matrix Factorization, DLMF and Social Network.*

1. INTRODUCTION

Now-a-days recommendation system plays an important role in suggestions for the items of user's interest. For that they use previous interactions records in the system in order to extract users' taste, and they provide a proper list of items to users, which music to listen, which item to buy or which book/news to read. In most of the social networking sites users

become directly interconnected to share all kinds of information like Professional Profile, Videos, Statues and News etc. One user is connected to the other users for sharing information between them. In social media sites like FaceBook, Twitters etc. the numbers of friends are increasing, the amount of sharing information also increasing, because of this information overloads problems is arises and this type of problems is solved using trust aware recommendation techniques.

Although RSs have widely been studied in both the academia and the industry, some important problems still remain such as Sparity problems, clod start problems and trustworthiness problem:

A. Cold Start problems:

The cold-start refers to the users, who have expressed no or a few ratings, or items which have been rated by no or a small number of users. Due to the lack of sufficient rating data, the similarity-based approaches fail to find out the nearest neighbor users or items and, in turn, deteriorate the recommendation quality via traditional recommendations algorithms.

B. Sparsity problems:

Users usually rate or experience only a small fraction of the available items. As a result, the density of the available ratings in RSs is often less than 1% [2]. Due to this data sparsity, collaborative filtering approaches suffer a lot of difficulties when trying to identify similar users in the system. Consequently, the prediction quality of the RS might be significantly limited.

C. Trustworthiness Problem:

Traditional RSs usually lack the capability of differentiating users' creditability, i.e., the trustworthiness of users' ratings. In reality, users may trust more on their friends' feedbacks rather than other ordinary users when making decisions. There also exist spam users, who always give fake ratings for malicious purposes. Apparently, such ratings should be excluded in recommendation making.

Due to the problems we find out a new solutions trust-based approach for recommendation in social networks. Figure 1 shows that the trust aware recommendation techniques example to illustrate the key idea of trust-aware recommendation techniques, in which users can rate items according to their personal experiences and table 1 show that the real world internet item rating scenario, users can rate according to personal experience.

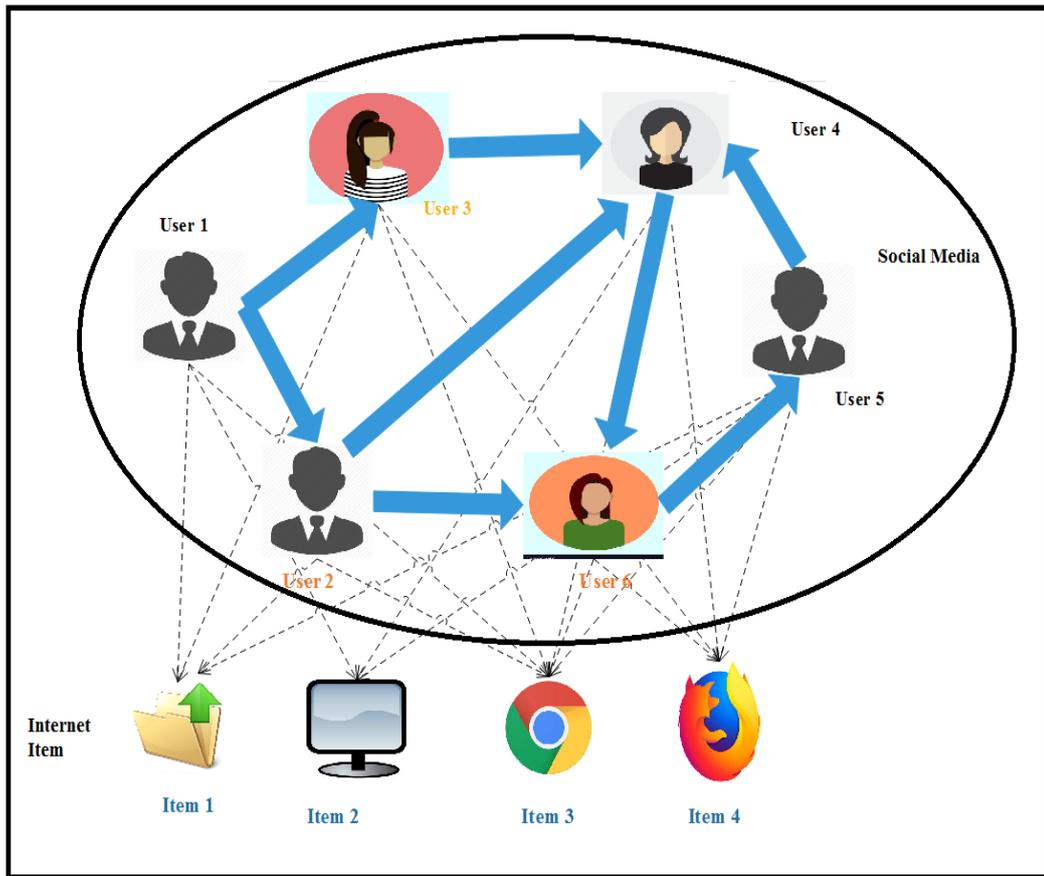


Figure 1: Trust-Aware Social Recommendation Examples

Items/ Users	Item 1	Item 2	Item 3	Item 4
User 1	*****	***	*	****
User 2	***	**		*****
User 3	*	*****	**	*
User 4	*****		*****	**
User 5		*****	***	*****
User 6	***	*****	**	

Table 1: Matrix of User Rating

2. LITERATURE SURVEY

Here we discussed the literature review of existing techniques:

S. K. Reddy, J. Hu, F. Alqadah and H. F. Alqadah [1] they propose Collaborative Filtering techniques for the top-n recommendation task they used bi-clustering neighborhood approach. The result shows that the proposed techniques generates a better recommendation than the existing State-of-Art algorithm on sparse data. The performance of the Biclustor Neighborhood (BCN) Framework is evaluated on five real world dataset such as Paypal dataset, lastfm dataset, lastfm_friends dataset, and delic_bookmarkdataset. Performance of BCN techniques is compared with the three different algorithms, namely SLIM (Sparse Linear methods), Item CF (Collaborative Filtering), and WRMF (Weighted Regulation Matrix Factorization).

Mahdi Jalili and Amin Javari [2], they proposed Probabilistic techniques to resolve Diversity-Accuracy Dilemma in the RS (Recommendation System). This proposed recommendation system has two models: First one is that maximization of the accuracy and second one is specified of the recommendation list to the tastes of the users. A recommended technique is based on the Markov model. For this experiment they are using two real datasets such as Movielens and Netflix. These datasets divided into the testing dataset and training dataset.

YanghuiRao, Zhiguo Gong, Nan Zhang and HaitaoZou [3], they proposed Topology-based ensemble model for combining users own taste and his trusted users/friends testes. Experimental analysis performed on the Flixster, Epinions, and Ciao for the better results. A proposed technique is not only applicable for Model-Based ensemble, but also Instance-Based ensemble recommendation techniques. Sentiment latent topic model (SLTM) is used for build a connection between sentiments and words.

GuandongXu, Xitong Li, Dongjing Wang and Shuiguang Deng [4], they propose emotional aware recommendation approach to incorporate an emotional context into music recommendation. They are using Chinese twitter services dataset. The performance of this technique improved in terms of precision, recall, hit rate and F1 score. A proposed technique is compared with two existing techniques such as Fine grain emotion from micro blogs and Coarse-Gained emotion information. In this they firstly music service is connected to the microblogs services such as SinaWeibo and Twitter for exacting more listing records. In this they improve the accuracy and efficiency of music recommendation techniques.

Zhao Hui Wu, Long Tao Huang and S. Shui Guang Deng [5], they proposed techniques for providing personalized service recommendation to individual's user, for this they used trust relationship between services and users. A proposed recommendation technique is based

on the collaborative filtering approach such as trust-based service recommendation. TSR techniques are compared with other five approaches relation based TSR, QoS on response rate, QoS on trough output, HITS and PAGERANK.

S. Dhillon, Cho Jui Hsieh, Hsiang Fu Yu, and Si Si, [6] they propose techniques for the solving the large scale matrix factorization problems in recommendation system. In this they used optimization techniques such as cyclic coordinate decent approach (CCD) and it is applicable to the large scale problems such as Maximum Entropy Model, NMF problems, Sparse Inverse Covariance Estimation and linear SVM. CCD approach updates the single variable at a time while keeping other fixed. The proposed system is comparing with the ALS, SGD, and CCD++ in large scale data. The dataset used for the experiment is Movielens 10m, Movielens 1m, Yahoo Music and Netflix.

Haesun Park, Mariyalshteva, and Ramakrishnan Kannan [7], they propose improved matrix factorization approach such as Bounded matrix factorization (BMF) approach for rating matrix. They test performance of the proposed algorithm on the real-world dataset such as Netflix and compare state-of-art algorithm with SVD++, SGD, Bias-SVD and ALSWR.

The overall finding of the above discussion is given below as Table-2

Sr. No.	Paper Name	Author	Method Proposed	Limitations
1.	Biclustering Neighborhood-Based Collaborative Filtering Method for Top-n Recommender Systems	C. K. Reddy, J. Hu, F. Alqadah and H. F. Alqadah	Collaborative Filtering techniques for the top-n recommendation task they used bi-clustering neighborhood approach.	The weakness of this BCN (Biclustering Neighborhood) technique is with dense datasets.
2.	A Probabilistic Model to Resolve Diversity Accuracy Challenge of Recommendation Systems	Mahdi Jalili and Amin Javari	Probabilistic techniques to resolve Diversity-Accuracy Dilemma in the RS (Recommendation System).	The main problem that restricts the usage of Markov models in commercial systems is low novelty of their recommended lists.
3.	Adaptive Ensemble with Trust Networks and Collaborative Recommendations	YanghuiRao, Zhiguo Gong, Nan Zhang and HaitaoZou	Topology-based ensemble model for combining users own taste and his trusted users/friends testes.	Weaknesses of these systems is that, although the users' trust networks are integrated into the recommender systems, the parameter used to balance the users' and their trusted users' tastes are constant, which neglects users' individual characteristics.

4.	Exploring User Emotion in Microblogs for Music Recommendation	GuandongXu, XitongLi, DongjingWang and ShuiguangDeng	Emotional aware recommendation approach to incorporate emotional context into music recommendation.	Association data of music and users extracted from microblog sparse, it is affected on accuracy of recommendation techniques.
5.	Trust-based personalized service recommendation: A network perspective	Zhao-Hui Wu, Long-Tao Huang and S. Shui-Guang Deng	Providing personalized service recommendations to individual user, for this they used the trust relationship between services and users.	The dataset in this paper is not so sparse as in reality and the rating matrix can be very sparse and normal recommendation algorithms can hardly keep high precision.
6.	Parallel matrix factorization for recommender systems	S. Dhillon, Cho-Jui Hsieh, Hsiang-Fu Yu, and Si Si	To solve the large scale matrix factorization problems in recommendation system.	This techniques not working on the real dataset.
7.	Bounded matrix factorization for recommender system	Haesun Park, Mariyalshteva, and Ramakrishnan Kannan	Improved matrix factorization approach such as Bounded matrix factorization (BMF) approach for rating matrix.	BMF algorithm, it is loses sparsity during the product of low-rank factors PQ.

Table 2: Comparative Analysis

3. TAXONOMY CHART

Technique	On Deep Learning for Trust-Aware Recommendations in Social Networks (2016)	Exploring user emotion in microblogs for music recommendation (2015)	Biclustering neighborhood-based collaborative filtering method for top-n recommender systems (2014)	Parallel Matrix Factorization for Recommender Systems (2013)	Bounded matrix factorization for recommender system (2012)
Trust Aware Recommendation					
Collaborative Filtering (CF)					

Social Trust Ensemble (STE)					
Matrix Factorization					
Deep Learning (DL)					

Table 3: Taxonomy Chart

4. CONCLUSION

We study the recommendation techniques such as Matrix Factorization (MF) for the Trust Aware Recommendation in Social networks based on the Deep Learning (DL) called as deep learning based matrix factorization (DLMF). This approach divided into the two phases of learning; in the first phase, deep auto-encoder is used for learn the initial value of Latent Feature Vectors of items and users and in a second phase, final Latent Feature Vector of item and users is used to minimizing objective functions. In objective function, includes both impacts of community effects on trust social network and users characteristics.

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