

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: www.ijirset.com

Vol. 7, Issue 5, May 2018

Domain-Sensitive Recommendation with User-Item Subgroup Analysis

Pooja Sachin Dharasurkar Prof. Ruhi Sodani

ME Student, Department of Computer Science and Engineering, MatsyodariShikshanSanstha's College of Engineering and Technology, Jalna.Dr.Babasaheb Ambedkar Marathwada University, Aurangabad, Maharashtra, India.

Department of Computer Science and Engineering, Matsyodari Shikshan Sanstha's College of Engineering and Technology, Jalna. Dr.Babasaheb Ambedkar Marathwada University, Aurangabad, Maharashtra, India.

ABSTRACT- Collaborative Filtering (CF) is one of the most successful recommendation approaches to cope with information overload in the real world. However, typical CF methods equally treat every user and item, and cannot distinguish the variation of user's interests across different domains. This violates the reality that user's interests always center on some specific domains, and the users having similar tastes on one domain may have totally different tastes on another domain. Motivated by the observation, in this paper, we propose a novel Domain-sensitive Recommendation (DsRec) algorithm, to make the rating prediction by exploring the user-item subgroup analysis simultaneously, in which a user-item subgroup is deemed as a domain consisting of a subset of items with similar attributes and a subset of users who have interests in these items. The proposed framework of DsRec includes three components: a matrix factorization model for the observed rating reconstruction, a bi-clustering model for the user-item subgroup analysis, and two regularization terms to connect the above two components into a unified formulation. Extensive experiments on Movielens-100K and two real-world product review datasets show that our method achieves the better performance in terms of prediction accuracy criterion over the state-of-the-art methods.

KEYWORDS: Recommender system, matrix factorization, user-item subgroup, collaborative filtering

I. INTRODUCTION

Recommender systems have been indispensable nowadays, which support users with possibly different judgments and opinions in their quest for information, through taking into account the diversity of preferences and the relativity of information value. Collaborative Filtering

(CF) is an effective and widely adopted recommendation approach. Different from content-based recommender systems which rely on the profiles of users and items for predictions,

CF approaches make predictions by only utilizing the user-item interaction information such as transaction history or item satisfaction expressed in ratings, etc. As more attention is paid on personal privacy, CF systems become increasingly popular, since they do not require users to explicitly state their personal information.

Nevertheless, there still exist some problems which might limit the performance of typical CF methods. On one hand, user's interests always center on some specific domains but not all the domains. However, typical CF approaches do not treat these domains distinctively. On the other hand, the fundamental assumption for typical CF approaches is that users rate similarly on partial items, and hence they will rate on all the other items similarly. However, it is observed that this assumption is not always so tenable. Usually, the collaborative effect among users varies across different domains.

In other words, two users have similar tastes in one domain cannot infer that they have similar taste in other domain. Taking an intuitive example, two users who love romantic movies probably have totally different preference in action movies. Thus, it is more reasonable and necessary to automatically mine different domains and perform domain sensitive CF for recommender systems.

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: www.ijirset.com

Vol. 7, Issue 5, May 2018

II. LITERATURE SURVEY

Sr.No	Author/Paper Name	Proposed System	Refer Points
1	Jing Liu, Yu Jiang, Zechao Li, Xi Zhang, and Hanqing Lu, "Domain-Sensitive Recommendation with User-Item Subgroup Analysis". IEEE TRANSACTIONS ON KNOWLEDGE AND DATA ENGINEERING, VOL. 28, NO. 4, APRIL 2016	In this paper, proposed a novel Domain-sensitive Recommendation (DsRec) algorithm, to make the rating prediction by exploring the user-item subgroup analysis simultaneously, in which a user-item subgroup is deemed as a domain consisting of a subset of items with similar attributes and a subset of users who have interests in these items. The proposed framework of DsRec includes three components: a matrix factorization model for the observed rating reconstruction, a bi-clustering model for the user-item subgroup analysis, and two regularization terms to connect the above two components into a unified formulation.	Domain-sensitive Recommendation (DsRec) algorithm, to make the rating prediction by exploring the user-item subgroup analysis.
2	A. Bellogin and J. Parapar, "Using graph partitioning techniques for neighbour selection in user-based collaborative filtering," in Proc. 6th ACM Conf. Recommender Syst., 2012, pp. 213–216.	In this work, we make use of one of these techniques, Normalized Cut, in order to derive a cluster-based collaborative filtering algorithm which outperforms other standard techniques in the state-of-the-art in terms of ranking precision. We frame this technique as a method for neighbour selection, and we show its effectiveness when compared with other cluster-based methods.	Cluster-based collaborative filtering algorithm which outperforms other standard techniques in the state-of-the-art in terms of ranking precision.
3	B. Xu, J. Bu, C. Chen, and D. Cai, "An exploration of improving collaborative recommender systems via user-item subgroups," in Proc. 21st Int. Conf. World Wide Web, 2012, pp. 21–30.	In this paper, to find meaningful subgroups, we formulate the Multiclass Co-Clustering (MCoC) problem and propose an effective solution to it. Then we propose a unified framework to extend the traditional CF algorithms by utilizing the subgroups information for improving their top-N recommendation performance.	CF algorithms by utilizing the subgroups information for improving their top-N recommendation performance.
4	J. Liu, Y. Jiang, Z. Li, Z. Zhou, and H. Lu, "Partially shared latent factor learning with multiview data," IEEE Trans. Neural Netw. Learn. Syst., vol. 26, no. 6, pp. 1233–1246, Jun. 2015.	This paper proposes a novel semi supervised multiview learning algorithm, called partially shared latent factor (PSLF) learning, which jointly exploits both consistent and complementary information among multiple views. In PSLF, a nonnegative matrix factorization (NMF)-based	A robust sparse regression model to predict the cluster labels of labeled data.

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: www.ijirset.com

Vol. 7, Issue 5, May 2018

		formulation is adopted to learn a compact and comprehensive partially shared latent representation, which is composed of common latent factors shared by multiple views and some specific latent factors to each view. With the learned representations of multiview data, we introduce a robust sparse regression model to predict the cluster labels of labeled data. By integrating the NMF-based model and the regression model, we obtain a unified formulation and propose a multiplicative based alternative algorithm for optimization.	
5	Z. Li, J. Liu, J. Tang, and H. Lu, "Robust structured subspace learning for data representation," IEEE Trans. Pattern Anal. Mach. Intell., vol. 37, no. 10, pp. 2085–2098, Oct. 2015.	In this paper we propose a novel Robust Structured Subspace Learning (RSSL) algorithm by integrating image understanding and feature learning into a joint learning framework. The learned subspace is adopted as an intermediate space to reduce the semantic gap between the low-level visual features and the high-level semantics. To guarantee the subspace to be compact and discriminative, the intrinsic geometric structure of data, and the local and global structural consistencies over labels are exploited simultaneously in the proposed algorithm.	

III. EXISTING SYSTEM

- Existing recommender systems have been indispensable now a days, which support users with possibly different judgments and opinions in their quest for information, through taking into account the diversity of preference and the relatively of information value.
- Collaborative Filtering (CF) is an effective and widely adopted recommendation approach. Different from content-based recommender systems which rely on the profiles of users and items for predictions,
- CF approaches make predictions by only utilizing the user-item interaction information such as transaction history or item satisfaction expressed in ratings, etc.
- Besides, most of these clustering CF approaches are performed in a two-stage sequential process: domain detection by clustering and rating prediction by typical CF within the clusters.

Disadvantages of Existing System

1. The existing system has some problems which might limit the performance of typical CF methods.
2. However, it is observed that this assumption is not always so tenable. Usually, the collaborative effect among users varies across different domains.
3. However, such divide-and-conquer style being a new problem i.e. the algorithm cannot take full advantage of the observed rating data which is limited and precious.

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: www.ijirset.com

Vol. 7, Issue 5, May 2018

IV. PROPOSED SYSTEM

In this work, propose a novel Domain-sensitive Recommendation (DsRec) algorithm, to make the rating prediction by exploring the user-item subgroup analysis simultaneously, in which a user-item subgroup is deemed as a domain consisting of a subset of items with similar attributes and a subset of users who have interests in these items. The proposed framework of DsRec includes three components: a matrix factorization model for the observed rating reconstruction, a bi-clustering model for the user-item subgroup analysis, and two regularization terms to connect the above two components into a unified formulation

Advantages of Proposed System

1. Develop a novel domain-sensitive recommendation algorithm, which makes rating prediction assisted with the user-item subgroup analysis.
2. DsRec is a unified formulation integrating a matrix factorization model for rating prediction and a bi-clustering model for domain detection.

V. CONCLUSIONS

In this paper, we develop a novel Domain-sensitive Recommendation algorithm, which makes rating prediction assisted with the user-item subgroup analysis. DsRec is a unified formulation integrating a matrix factorization model for rating prediction and a bi-clustering model for domain detection. Additionally, information between these two components are exchanged through two regression regularization items, so that the domain information guides the exploration of the latent space. Systematic experiments conducted on three real-world datasets demonstrate the effectiveness of our methods. It is worth noting that our method is totally based on the user-item rating matrix. In the future, we will attempt to explore both user-item interaction information and some external information simultaneously for domain detection.

REFERENCES

- [1] Jing Liu, Yu Jiang, Zechao Li, Xi Zhang, and Hanqing Lu, "Domain-Sensitive Recommendation with User-Item Subgroup Analysis". IEEE TRANSACTIONS ON KNOWLEDGE AND DATA ENGINEERING, VOL. 28, NO. 4, APRIL 2016
- [2] A. Bellogin and J. Parapar, "Using graph partitioning techniques for neighbour selection in user-based collaborative filtering," in Proc. 6th ACM Conf. Recommender Syst., 2012, pp. 213–216.
- [3] B. Xu, J. Bu, C. Chen, and D. Cai, "An exploration of improving collaborative recommender systems via user-item subgroups," in Proc. 21st Int. Conf. World Wide Web, 2012, pp. 21–30.
- [4] J. Liu, Y. Jiang, Z. Li, Z. Zhou, and H. Lu, "Partially shared latent factor learning with multiview data," IEEE Trans. Neural Netw. Learn. Syst., vol. 26, no. 6, pp. 1233–1246, Jun. 2015.
- [5] B. M. Sarwar, J. Konstan, and J. Riedl, "Recommender systems for large-scale e-commerce: scalable neighborhood formation using clustering," in Proc. 5th Int. Conf. Comput. Inf. Technol., 2002, pp. 1–6.
- [6] G.-R. Xue, C. Lin, Q. Yang, W. Xi, H.-J. Zeng, Y. Yu, and Z. Chen, "Scalable collaborative filtering using cluster-based smoothing," in Proc. Res. Develop. Inf. Retrieval, 2005, pp. 114–121.
- [7] A. Bellogin and J. Parapar, "Using graph partitioning techniques for neighbour selection in user-based collaborative filtering," in Proc. 6th ACM Conf. Recommender Syst., 2012, pp. 213–216.
- [8] M. O'Connor and J. Herlocker, "Clustering items for collaborative filtering," in Proc. ACM SIGIR Workshop Recommender Syst., 1999, pp. 1–4.
- [9] L. Ungar, D. Foster, E. Andre, S. Wars, F. S. Wars, D. S. Wars, and J. H. Whispers, "Clustering methods for collaborative filtering," in Proc. Workshop Recommendation Syst., 1998, pp. 114–129.
- [10] L. Si and R. Jin, "Flexible mixture model for collaborative filtering," in Proc. 20th Int. Conf. Mach. Learn., 2003, pp. 704–711.
- [11] A. Banerjee, I. Dhillon, J. Ghosh, S. Merugu, and D. S. Modha, "A generalized maximum entropy approach to Bregman co-clustering and matrix approximation," in Proc. 10th ACM KDD, 2004, pp. 509–514.
- [12] T. George and S. Merugu, "A scalable collaborative filtering framework based on co-clustering," in Proc. 5th IEEE Int. Conf. Data Mining, 2005, pp. 625–628.