

Title: An efficient graph based trust-aware recommendation system

Introduction(min-600 words): Recommender systems have been evolving rapidly with the advancement in technology, research and infrastructure. Recommendation systems are applied in various areas such as E-commerce, movies, music, search-query, social-media and many more. Collaborative and content-based recommender systems are widely adopted [1]. Collaborative filtering approaches utilize the past behavior of users and the similarity between users for performing recommendations. Collaborative filtering approaches often suffer from problems such as rating coverage, data sparsity and cold start problems [2]. Data Sparsity occurs when there are a small number of ratings present in a recommender system [3], that is caused when user rates only a few number of ratings in the recommender system. The cold-start problems occur on the recommendation of new users. To achieve accurate recommendations, a large amount of data on a user is required. The large amount of data increases the computational overhead of the system. To reduce this issue, various clustering techniques in recommender systems have been used to solve the problems in collaborative filtering-based recommender systems. Similar batches of users or items are grouped together in clustering methods. The essential theme is that similar users may have the matching likes and dislikes. Correctness of rating predictions can be improved by clustering approaches. (...)

Survey of existing work related to your project idea (min-750 words):

Dakhel et al. [4] presented an approach based on the K-means clustering algorithm for the recommendation system [5, 6]. K-means algorithm uses euclidean distance in order to make the clusters. initially it takes random points as the center of the clusters and gradually moves toward getting the best center for that cluster. In order to get the best center, every point has to be compared with all the centers so it involves more computations. Later in 2013 Liao et al. [7] introduced an efficient K-means model which reduces the computation time but accuracy is not changed. Nagamma et al. [8] have shown that Hierarchical Clustering algorithm Chameleon performs better than Dakhel et al. approach, because K-means based approach suffers from various drawbacks one of them being the number of cluster formed after the execution of the algorithm, as there is not any way to decide optimal number of clusters so random number of clusters are formed. but in chameleon [9] based approach clusters are naturally formed. In real life scenarios two users might be having same mind set on some set of items but they may have opposing likes on other set of items, this was discovered by Xu et al. [10], they expanded the idea of [11] by not making the prediction for the user choice using the entire set of rating instead they used subgroups for making predictions. (.....)

Can you use the basic graph theory in your project idea (Give your answer with proper reason) (In 100 to 150 words only): Yes, most of the existing clustering based recommendation systems are not suitable for the complex datasets because they are unable to identify the hidden patterns from the dataset. Minimum spanning tree (MST) of a complete graph easily captures the intrinsic neighborhood

information of different characteristic datasets. That's why we want to propose the minimum spanning tree based recommendation system. (.....)

References:

- [1] Di Noia, T., Rosati, J., Tomeo, P., Di Sciascio, E.: Adaptive multi-attribute diversity for recommender systems. *Information Sciences* 382, 234–253 (2017)
- [2] Moradi, P., Ahmadian, S., Akhlaghian, F.: An effective trust-based recommendation method using a novel graph clustering algorithm. *Physica A: Statistical Mechanics and its Applications* 436, 462–481 (2015)
- [3] Nilashi, M., Jannach, D., bin Ibrahim, O., Ithnin, N.: Clustering-and regression-based multi-criteria collaborative filtering with incremental updates. *Information Sciences* 293, 235–250 (2015)
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