Title: Personalizing Recommendation in E-Commerce and Micro-blog Social Networks

Speaker: Mr Zhao Gang
Date/Time: 1 October 2014, Wednesday, 10:00 AM to 11:30 AM
Venue: Executive Classroom, COM2-04-02
Supervisor: Dr Lee Mong Li, Janice, Professor, School of Computing

Abstract:

E-commerce and microblogs have emerged as two important applications of Web 2.0 technology. Service providers rely heavily on personalized recommender systems to drive sales and social interaction respectively.

This thesis seeks to address the challenges of data sparsity and scalability in recommender systems, and proposes methods to improve the performance of personalized recommendation in e-commerce and microblog social systems.

We first examine the problem of product recommendation from the perspective that the value of a product for a user changes over time. We observe that the intervals between user purchases may influence a user’s purchase decision, and propose a framework that utilizes purchase intervals to improve the temporal diversity of the recommendations. Given the scale of users, products and purchase histories in any e-commerce website, it is necessary to efficiently compute the purchase interval between pairs of product for all users. We design an algorithm to compute purchase intervals from users' purchase histories, and incorporate the purchase intervals into a matrix factorization based method. We demonstrate on a real world e-commerce data set that the proposed approach improves the conversion rate, precision and recall, as well as achieve a significantly higher temporal diversity compared to traditional recommender systems.

Next, we observe that users may have different preferences when purchasing different subsets of items, and the periods between purchases also vary from one user to another. We propose a framework that leverages on the Latent Dirichlet Allocation (LDA) method to generate clusters that capture users' hidden preferences for items as well as item time sensitivity before we apply matrix factorization on each cluster to personalize the recommendations.
We introduce the notion of a cluster purchase interval factor which estimates the probability that users in a cluster will purchase an item. Experiment results indicate that our approach is scalable and significantly improves the conversion rate (by up to 10%) of state-of-the-art product recommender methods.

Finally, we examine how the LDA approach to find latent clusters can be applied to improve user recommendation in microblogs. We utilize the follower-followee relationship and devise an LDA based method to discover communities among the users. These communities capture the hidden interests of users as they actively choose their followees. We apply the state-of-the-art matrix factorization approach on each community and generate the final top-k recommendation based on the recommendation lists obtained in each community. Extensive experiments on real world Twitter and Weibo data sets demonstrate that the proposed framework is scalable and effective in reducing the data sparsity of each community.