

# CSE494/598 - Social Media Mining, HW#4

## Recommendation in Social Media

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Due: November 27, 2013, 11:59 PM (SUBMIT ON  
BLACKBOARD)  
only softcopy

### Problem 1 - Social Recommendation

Implement a movie rating prediction program for both item-based and user-based collaborative filtering for the MovieLens 100k dataset available at

<http://grouplens.org/datasets/movielens/>

Your program must take as input a user-item matrix (same format as u.data), the neighborhood size, a user id 'u', and an item-id 'i' and should provide the predicted rating for both user-based CF and item-based CF as output.

### Problem 2 - Social Recommendation

- a) For the same dataset and for the 10 movies (1,2,3,4,5,7,8,13,14,18) from <http://www.imdb.com/chart/top> (movie id is in u.item file), select all provided ratings from the movielens dataset. Construct a user-item matrix  $X$  from these ratings. Assume that missing ratings have value -1. Perform a rank-2 approximation on the user-item matrix. Plot movies in a 2-dimensional space. Your plot should look like Figure 9.1 in the text book and you can follow the procedure in Example 9.3.
- b) User 269 has provided rating 4 for movie 127 (the godfather). Set this rating to -1 in your user-item matrix  $X$  and use your program in problem 1 to predict this rating using user-based and item-based CF (2 values) with neighborhood size set to 5. Now, get the rank-2 approximation ( $X_k$ ) of your matrix using SVD.
  - Use  $X_k$  to find most similar items to 127 or users to 269 by computing cosine similarity between rows of  $U_k$  or columns of  $V_k^T$ . Assume neighborhood size is 5.

- Use ratings in  $X$  (not  $X_k$ ) and similarities obtained using  $X_k$  to predict the missing rating using user-based and item-based CF. In a sense, the only part that has changed from problem 1 is that you use  $X_k$  to compute the top 5 neighbors and similarities  $sim(i, j)$ .

Submit your (1) code, (2) plot, and (3) predicted ratings with and without SVD (4 values).