

Using Ranking Support Vector Machines for Group Recommendations: Restaurant Recommendations on Yelp Data

Hui Fen (Sarah) Tan¹, Rahmtin Rotabi², and H. Giang T. Nguyen²

¹Department of Statistics, Cornell University, Ithaca, NY

²Department of Computer Science, Cornell University, Ithaca, NY

¹ht395@cornell.edu

Abstract:

Group recommendation systems are particularly useful for communal activities, such as dining out. Such a system needs to consider the different preferences and restrictions of multiple individuals in a group and provide a recommendation that satisfies the group of individuals according to some criterion. Using Yelp data in five cities over nine years [1], we build a restaurant recommendation system for individuals and groups. For each of 4.9k individual Yelp users, we create a ranking support vector machine [2] model, using features on the restaurants the user reviewed to learn a hyperplane that reflects his or her preferences. We propose a happiness metric, where how happy a user is about a restaurant corresponds to the signed distance from the restaurant to the user's hyperplane in feature space. To approximate communal dining situations, we draw random combinations of users' friends. We contrast results obtained from different ways of aggregating happiness across a group of users, such as maximizing average happiness and maximizing minimum happiness. This method falls within the latter of two common approaches to group recommendation systems, namely aggregating individual user profiles vs. aggregating individual recommendations [3].

[1] Yelp. *Yelp Dataset Challenge*. http://www.yelp.com/dataset_challenge

[2] Joachims, T. *Optimizing Search Engines Using Clickthrough Data*. Proceedings of the ACM Conference on Knowledge Discovery and Data Mining (KDD). ACM. (2002).

[3] Ricci, F., Rokach, L., Shapira, B. and P.B. Kantor. *Recommender Systems Handbook*. Springer. (2011).



Figure 1. Prediction accuracy for 4.9k Yelp users bucketed by number of restaurant reviews made.