

Rating Prediction via Exploring Service Reputation

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Abstract—With the explosion of e-commerce, it presents a great opportunity for people to share their consumption experience in review websites. However, at the same time we face the information overloading problem. How to mine valuable information from these reviews and make an accurate recommendation is crucial for us. Traditional recommender systems (RS) consider many factors, such as product category, geographic location, user's purchase records, and the other social network factors. In this paper, we firstly propose a social user's reviews sentiment measurement approach and calculate each user's sentiment score on items/services. Secondly, we consider service reputation, which reflects the customers' comprehensive evaluation. At last, we fuse service reputation factor into our recommender system to make an accurate rating prediction, which is based on probabilistic matrix factorization. We conduct a series of experiments on Yelp dataset, and experimental results show the proposed approach outperforms the existing RS approaches.

I. INTRODUCTION

As we all know, service reputation is important for customer to make decisions, which reflects consumers' comprehensive evaluation based on the intrinsic value of a specific product. If we want to know service reputation, users' textual reviews are necessary. In our daily life, users are most likely to buy those items that are posted with highly praise reviews. Hence, how to mine reviews information to recommend user favourite and satisfying items has become an important issue in web mining, machine learning and natural language processing.

Extracting users' interests with the content of reviews has received considerable attention in recent years. The rise like Douban¹, Yelp² and other review websites has provided a broad thought in mining users' preferences and predicting users' ratings. Jiang et al. [19] propose an author topic model-based collaborative filtering (ATCF) method, which facilitates comprehensive points of interest (POIs) recommendations for social users. We observe that in many practical cases, it is more important to provide numerical ratings rather than binary decisions. Especially when a customer compares several candidate products, all of them reflect positive sentiment in a binary classification. To make a purchase decision, customers not only need to know whether the product is good or not, but also how good the product is [7]. In our daily life, when we search the net for purchasing, both positive reviews and negative reviews are valuable to be as reference. For positive

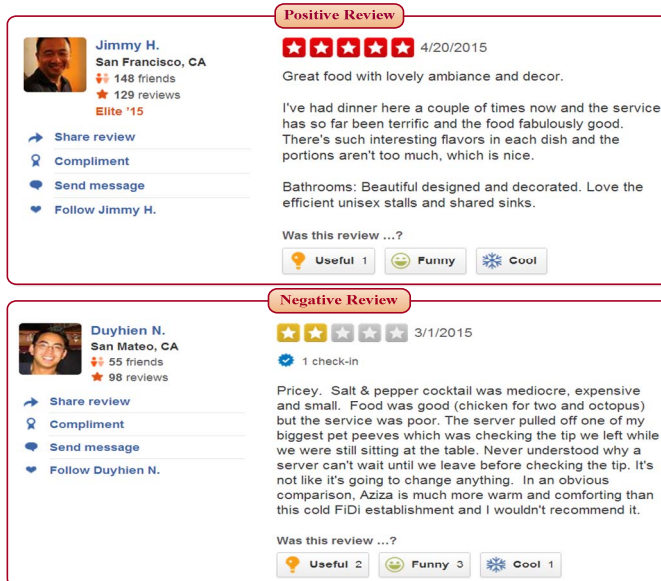


Fig. 1. An example of positive review and negative review on Yelp website.

reviews, we can know the advantages of the product. For negative reviews, we can obtain the shortcomings in case of being cheated. In Fig.1, we intuitively show an example of positive reviews and negative reviews on Yelp website. From Fig.1, there are many positive words in a 5-star review, such as “great”, and “lovely”. But in a 2-star review we find negative words, such as “expensive”, and “poor”. That means a good review reflects a high star-level and a bad review reflects a low-level. When we know the advantages and disadvantages from the two kinds of reviews, we can easily make a decision. Normally, if item's reviews reflect positive sentiment, then the item may be with good reputation. Oppositely, if item's reviews are full of negative sentiment, then the item is most likely with bad reputation. So based on users' reviews sentiment, we can infer users' comprehensive ratings on items. However, users' sentiment is hard to predict and the unpredictability of service reputation makes a great difficulty in exploring social users.

To address these problems, we propose a rating prediction model, which makes the best use of users' sentiment extracted from the textual descriptions of users' reviews/comments. When compared with previous works [1-3], [6], [7], [17]-[22] the main difference is that: previous works mainly focus on exploring social user's salient feature and discussing how to classify sentiment, and do not go deeper in mining users' sentiment for potential applications. But in our paper, we adequately mine user's sentiment, and leverage the sentiment to infer service reputation which proved to make great contributions to the prediction accuracy of RS.

¹ <http://www.douban.com>

² <http://www.yelp.com>