PREDICTING CONSUMER INFORMATION SEARCH BENEFITS FOR PERSONALIZED ONLINE PRODUCT RANKING: A CONFIDENCE-BASED APPROACH

Mingyue Zhang, School of Economics and Management, Tsinghua University, Beijing, China, zhangmy.12@sem.tsinghua.edu.cn

Xunhua Guo, School of Economics and Management, Tsinghua University, Beijing, China, guoxh@sem.tsinghua.edu.cn

Guoqing Chen, School of Economics and Management, Tsinghua University, Beijing, China, chengq@sem.tsinghua.edu.cn

Qiang Wei, School of Economics and Management, Tsinghua University, Beijing, China, weiq@sem.tsinghua.edu.cn

Abstract

Online shopping was enabled by the expansion of Internet and digital sources, but at the same time “information overload” has been a serious problem due to the rapid growth in volume of products. Product ranking mechanism is an important service for e-commerce that facilitates consumers’ decision-making process and attracts a number of scholars doing valuable and interesting research. This paper studies online product ranking under uncertainty.

In previous studies, online product ranking methods are mostly developed in the perspective of “Collaborative Filtering” in which the products are ordered with descending predicted ratings. Nevertheless, it is argued that directly using predicted ratings as ranking scores may not be the best solution because there is always uncertainty along with point prediction. Firstly, they neglect the fact that a single product is just a part of the whole set containing inspected products. The net benefits of consumer information search are generated from all the inspected products, and therefore a newly inspected product cannot be isolated from the previous process and ranked independently. Secondly, the rating distribution on a product among all the consumers is not taken into account, and therefore the uncertainty in the prediction is not addressed.

In this paper, taking uncertainty and prediction confidence into consideration, we propose a new personalized product ranking method (‘Point Estimation Incorporating Uncertainty and Prediction Confidence’, PUPC) which proceeds from estimating consumer information search (CIS) benefits. To be specific, the ideal order for products should be that, when a customer inspects products sequentially, his/her acquired benefits increase but the increasing rate decreases. Therefore, we first propose a confidence-based method for estimating CIS benefits and then apply this estimation result into product ranking based on above principle.

Experiments using real data of movie ratings illustrate that the proposed method is advantageous over traditional point estimation methods both in search scenario and recommendation scenario, thus may help enhance customers’ satisfaction with the decision-making process and choices through saving their time and efforts.

Keywords: Consumer search benefits, Ranking, Collaborative filtering, Prediction confidence

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