Abstract:
The purpose of this paper is to formulate the problem of designing a personalized recommender system for an online business-to-business (B2B) marketplace, to propose a method to solve the problem, and to demonstrate results from a field experiment. Our research is conducted in collaboration with IndiaMart, which is the dominant online B2B platform in India serving approximately 60 million buyer firms and 5 million seller firms in more than 50 million products and services across thousands of cities. In the problem we study, buyers place requests for quotation (RFQs) to the platform, and the objective of the platform is to match the RFQs with suitable sellers with the highest likelihood of acceptance. We formulate IndiaMart's problem as the computation of a seller's probability of accepting an RFQ based on preferences estimated from historical transactions. Our problem entails two major challenges: (1) class imbalance such that the volume of 'accepted' records is significantly larger than that of 'declined' records, (2) high-dimensional and sparse data regarding product category and spatial engagement. To address high-dimensionality, we propose new closeness metrics, and to counter class imbalance, we evaluate three alternative approaches including SMOTE and a new resampling approach, which we call Panel Data Augmentation Technique (PDATE). Our method yields a significant improvement in out of sample measures of precision and recall. A controlled field experiment conducted at IndiaMart shows that our method provides a consistent and significant improvement in the quality of recommendations sustained over time.