Scalable Price Targeting

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Abstract

We propose a Bayesion Decision-Theoretic approach for implementing targeted "personalized" price discrimination using a high-dimensional vector of observed customer characteristics. The approach consists of applying a Bayesian Bootstrap to a regularized logit demand model using a lasso. We use the bootstrap to quantify the uncertainty around the regularized demand estimates and the firm's profitability from different pricing decisions. We illustrate the proposed approach using a case study of business-to-business pricing at a large, online recruiting company. We first run a randomized price experiment to ensure that our training data can identify the causal effect of price on individual demand. The experiment provides us with a model-free estimate of demand. We use these data to estimate demand and conduct decision-theoretic optimal uniform and personalized pricing. The approach allows for customer-specific personalized prices. We then conduct a second experiment with new customers to create a prediction sample to validate our price recommendations and the proposed method for quantifying uncertainty. Optimized uniform pricing improves revenues by 64.9% relative to the control pricing, whereas personalized pricing structure improves revenues by 81.5%. These improvements hold both in the training sample and in the subsequent prediction sample.

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