

Information Provision with Information Overload

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Information provision refers to sharing or releasing data, such as companies disclosing product information to customers. Motivated by e-commerce applications, we consider a product promotion problem where a product showcase webpage is personalized for each arriving customer during a campaign. The product has various features that may affect customers' willingness to click (purchase), and each customer can weigh these features differently. Displaying all the product features to customers can sometimes lead to *information overload*, meaning customers are overwhelmed by excessive product information and feel less interested in the product. In a recommendation system framework with one seller and T customers, **how can the seller filter and display effective product features to avoid losses caused by information overload while optimizing the current push mode based on historical data?**

Based on the evidence from a field experiment by Air China, we *build a new feature-based logit model to capture the information overload effect in customers' binary choice behavior*, such as clicking. Faced with this probabilistic choice model with unknown parameters, we design a statistical learning algorithm that carefully perturbs the showing features of the product and then exploits the estimated model to optimize the product display page for each arriving customer. Accounting for the information overload effect, we introduce *new guidelines for selecting experimental product displays* in the exploration stage to learn customers' preference weights for product features and simultaneously estimate the impact of information overload (relating to the number of displayed product features). Our policy achieves the expected cumulative regret that scales in the rate of $\sqrt{T} \log T$, where the regret is defined as the relative loss in reward against a clairvoyant who has perfect information. In a B2B field experiment in collaboration with a medical agent, we randomly display a product webpage with varying amounts of product information to arriving customers and observe the information overload phenomenon. Using the experimental data to calibrate our model, we test the performance of our policy.

Our algorithmic framework provides guidelines for online retailers to optimize their product display on the fly while avoiding overwhelming consumers with excessive information.