

## **Decision-Theoretic Loss Function: An Application to Pricing**

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### **Abstract**

A traditional data-driven approach for marketing decisions emphasizes estimating a demand model, then using the estimated model for prescriptive decisions, such as pricing decisions, to maximize profits. Such an approach is agnostic of the downstream decision of profit maximization when estimating the demand, hence it may not be the most appropriate model. We proposed a decision-theoretic approach (DTA) that guides the estimation of the demand, which considers downstream decisions. We apply our DTA approach to IRI scanner data and show that our DTA approach predicts profit more accurately out of sample than the traditional approach, and our DTA approach gives higher expected profits than the traditional approach. We also compare with estimating profits directly and show that our DTA approach still performs better in predicting profits and yielding higher expected profits. Therefore, our approach has a crucial managerial implication that it is more appropriate to use when the downstream decision is to set prices that maximize profits.

Keywords: Decision-theoretic approach, Optimal pricing, Machine learning.