Marketing Colloquia
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OVERCOMING THE COLD START PROBLEM OF CRM USING

A PROBABILISTIC MACHINE LEARNING APPROACH

ABSTRACT: The success of Customer Relationship Management (CRM) programs ultimately depends on the firm's ability to understand consumers' preferences and precisely capture how these preferences may differ across customers. Only by understanding customer heterogeneity, firms can tailor their activities towards the right customers, therefore increasing the value of customers while maximizing the return on the marketing e orts. However, identifying differences across customers is a very difficult task when firms attempt to manage new customers, for whom only the first purchase has been observed. For those customers, the lack of repeated observations poses a structural challenge to infer unobserved differences across them. This is what we call the "cold start" problem of CRM, whereby companies have difficulties leveraging existing data when they attempt to make inferences about customers at the beginning of their relationship.

In this research we propose a solution to the cold start problem by developing a modeling framework that leverages the information collected at the moment of acquisition. The main aspect of the model is that it captures latent dimensions that govern both the behaviors observed at acquisition as well as future propensities to buy and to respond to marketing actions. Using probabilistic machine learning, we combine deep exponential families with the demand model, relating behaviors observed in the first purchase with consequent customer behavior. The model can be integrated with a variety of demand specifications and is flexible enough to capture a wide range of heterogeneity structures (both linear and non-linear), thus being applicable to a variety of behaviors and contexts. We also demonstrate the model's ability to handle large amounts of data while overcoming commonly faced challenges such as data redundancy and the presence of irrelevant information.

We validate our approach in a retail context and illustrate how the focal firm can overcome the cold start problem by applying the proposed modeling framework to their existing transactional database. We demonstrate the model's ability at identifying high-value customers as well as those most sensitivity to marketing actions, right after customers have been acquired. Finally, we show that the focal firm would significantly improve the return on their marketing actions if they targeted recently acquired customers based on the inferences from the model.

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