Department of Marketing

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When Less is More: Using Short-term Signals to Overcome Systematic Bias in Long-run Targeting

Abstract: Firms are increasingly interested in developing targeted interventions for customers with the best response. Doing so requires firms to identify differences in customer sensitivity, which they often obtain using uplift modeling (i.e., heterogeneous treatment effect estimation). To optimize the long-run business performance, firms should, in theory, construct such models for a long-term outcome. However, we show that targeting using such models fails to improve (even hurts) firms' long-run profitability when the outcome of interest accumulates noisy customer behaviors over time. We identify two causes of this problem. First, most state-of-the-art uplift models misattribute noise to the treatment effect, making firms fail to identify customers with the highest long-run sensitivity. Second, customer attrition, present in most marketing contexts, exacerbates the problem by creating an identification issue. To overcome this problem, we argue that firms should only use less-noisy short-term signals to estimate heterogeneity in the long-term treatment effect. In particular, we propose a novel imputation technique that reduces noise in attrition and transaction processes. Using simulation and a real-world experiment, we show that (i) using short-term signals instead of the actual long-term outcome in targeting can significantly improve the long-run profitability, and (ii) the proposed technique outperforms the existing imputation approaches.