Contribution ID: **27** Type: **not specified**

Decision Reliability in Uplift Modeling: A Stability- and Value-Driven Framework for Customer Retention Policy Selection

A stability-aware, value-driven framework for uplift policy selection is presented, applied to a telecommunications churn-retention dataset. The central argument is that reliable deployment of an uplift model requires more than optimizing a causal ranking metric: the targeted customer set must remain consistent across repeated training runs, and the selected policy must be economically sound and interpretable. Competing algorithmic families, including causal meta-learners, transformed-outcome approaches, four-quadrant models, and a conventional response baseline, are evaluated under a repeated-run experimental protocol that jointly quantifies economic effectiveness, run-to-run reliability of both targeted and persuadable customer sets via Jaccard-based consistency indices, and interpretability through surrogate CART distillation into compact Boolean decision rules. A Stability-Adjusted Revenue index synthesizes value and reliability into a single deployment-oriented criterion. Two complementary empirical regimes are examined: a semi-synthetic scenario with controlled treatment effects and an observational proxy scenario. Results reveal two significant findings: (i) the highest-yielding policy suffers from severe targeting instability, exposing a structural risk-return trade-off concealed by single-metric selection; and (ii) causal architectures do not universally dominate, as a conventional response model proves economically superior under confounded observational conditions. Developed within a regional research program and validated through an ongoing industrial implementation, this work extends the methodological framework toward practical, auditable deployment of causal machine learning.

Special/ Invited session

Classification

Mainly application

Keywords

Uplift Modeling; Decision Reliability; Algorithmic Stability

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Track Classification: AI: Machine Learning and Predictive Analytics