MIT MANAGEMENT SLOAN SCHOOL

Promoting Financial Products to Bank Customers: From a Prescriptive Analytics Perspective

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Problem summary

In the competitive sector of financial services, banks must optimize marketing strategies to efficiently allocate resources and maximize profits. Rather than merely selling all products or merely predicting customer purchases, the goal is to craft a model that aligns the most lucrative marketing approach to potential customer purchases.

Our project delves into a retail bank's 2016 transaction data for three products: savings, mortgage, and pension accounts. Following a 2017 merger, the bank aims to deploy tailored marketing campaigns to new customers to maximize profitability.

The main decisions to be made are:

1) Which customers should be contacted?
2) Which product should be proposed to each customer?
3) In which way should we contact a customer?

Datasets

There are two datasets for this project:

1) https://raw.githubusercontent.com/vberaudi/utwt/master/known_behaviors2.csv
   This dataset includes all the customers in 2016, with their financial data and whether they bought savings, mortgage, and pension accounts.
2) https://raw.githubusercontent.com/vberaudi/utwt/master/unknown_behaviors.csv
   This dataset includes the new customers in 2017 after the merger with the same variables except for which accounts they bought.

Methods

Our project will use both predictive and prescriptive approaches that given the observational data (customer personal and financial data), output the product to be sold to a customer (treatment) that results in the highest profit based on the marketing campaign. The following four approaches will be implemented independently to make decisions:

1) ***Predictive analytics approach*** (as baseline models): use sample average estimation and point prediction (powered by Random Forest) to build two baseline models
2) ***Data-driven predictive prescription approach***: leverage K-Nearest-Neighbors to build a basic prescriptive model
3) ***Optimal Policy Trees***: estimate counterfactuals through three methods (direct method, propensity score estimation, and doubly robust estimation)
4) ***Kernel methods***: obtain more robust results (if time permits)

The four approaches will be compared to choose the most profitable one. Furthermore, these prescriptive models also will be evaluated based on the Coefficient of Prescriptiveness.

Challenges and ideas to overcome them

1) **Lack of data**: No data on the revenue of each product and no data on the different marketing strategies. However, we can choose these values in an intelligent way, so that the model will be more of an optimal framework that can be applied to optimize profits.
2) **Class imbalance**: If one of the products is far more popular than the others, we might face class imbalance which can lead to skewed results. Resampling methods like upsampling, downsampling, and SMOTE can be applied to deal with it.
3) **Difficulty in feature selection**: Feature engineering techniques can be applied.