

## Marketing Analytics -- How can a bank better target it's promotions?

**Situation:** Universal Bank (name changed) has been targeting customers with various offers for its mortgage loan products. The historical performance of these campaigns has been single digit (8-10%) response rates. A new Stern MSBA alumni, Jasmin Ali, has been appointed the CMO, and she has laid out a challenge to the marketing team to do better. In fact, she was flabbergasted when the analyst told her that their campaigns “cannot do any better as the competition is in the 5-6% response rate, and this just how things are in direct marketing.” Jasmin asked a simple question, “have we **tried to learn anything** from our past campaigns to target better?”

**Complication:** There are many challenges in the analytics of direct marketing. One of them, from a machine learning perspective, is the generally low response rate to the promotions that inundate customers. If only 10% of the past customers who were targeted responded can we learn anything from that?

**Key question:** Given a 500 person target list that the marketing team has been given, who are those top 50 people they should invite for a special cocktail event. Note that they can spend top dollars to attract mortgage customers who typically have a lifetime value in the hundreds of thousands of dollars.

**Solution approach:** We are going to apply the binary classification models we have learnt (k-nearest neighbors, decision trees and logistic regression) to this new dataset. Then we will choose the best model and apply it to score the target list, rank ordering them by likelihood of response to pick the top 50. Because we have an imbalance/skewed outcome class distribution (this is a common occurrence in binary classification, think of loan defaults or corporate bankruptcies or click throughs on ads - all these are rare events), we will delve into how to go beyond simple accuracy, and appreciate the need for metrics such as precision, recall, F-Measure and Kappa statistic.

**Deck:** Predictive modeling contd.

**Dataset**<sup>1</sup>; see folder (XLS file)

**R Code:** see folder (R file)

*Key technical concepts*

- Predicting probabilities
- Setting your own thresholds
- Hyper-parameter tuning -- under the hood

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<sup>1</sup> Shmueli et al, Business Analytics using R, Wiley, 2020.

- Scoring new data
- Doing cost benefit analysis based profit maximization to pick the best model

**Discussion questions:**

1. Should we care about model explainability for this problem? In general? How should we think about trading off model accuracy with explainability?
2. How much better off should we expect to be in picking 50 people in the target list using machine learning than the baseline response rate.
3. Are all types of classifications equally beneficial? Is a true positive as valuable as a true negative? Is a false negative as costly as a false positive? Can we use costs and benefits and expected value to choose the best model?
4. What data should we use when it comes to model deployment?
5. Which of the three models should we use if we want the most fine grained (not coarse) probabilities?