

Replication Code: Managing Churn to Maximize Profits

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Preamble

This document is built using R Markdown and shows how to replicate the results of Lemmens and Gupta (2020). Because the data used in the manuscript are subject to a non-disclosure agreement, this document is based on a synthetic dataset, which mimics the original observed data and preserves the relationships between variables but does not contain any disclosive records. As a consequence, results reported in this document are different from the ones reported in the paper. Please note that knitting this file might take a while when using bootstrapping (i.e., B greater than 1 in the code), as the file estimates all models tested in the main manuscript, including all benchmark models. A R package is currently under development and will be released soon. You can find the latest information on www.aurelielemmens.com. Note that the set of results reported below are for the profit-based loss with left weighting. The code can be adapted as described in the R markdown document to display right weighting or symmetric weighting.

The replication files include:

- the main code as R Markdown file (LemmensGupta2020_replication.rmd),
- all functions that the R Markdown file is calling (.r files),
- and the synthetic dataset (mysynthdata.Rdata or mysynthdata.csv).

Table 1: Average holdout campaign profit for different estimation methods

```
##
## Average campaign holdout profit for different estimation methods (2 iterations)
## =====
##                               Holdout Profit
## -----
## Classic Loss                 -1,480.864
## Reordered Classic Loss       -921.507
## Uplift Model                 4,104.105
## Our Approach                 5,703.139
## -----
```

Table 2: Average holdout campaign profit for different target size determination methods

```
##
## Average campaign holdout profit for different target size determination methods (2 iterations)
## =====
##                               Holdout Profit
## -----
## Fixed Target Size based on Churn Rate    3,658.633
## Fixed Target Size based on Budget        439.825
## Optimized Target Size based on Verbeke   280.271
## Optimized Target Size 10% Buffer         3,068.819
## Our Approach                            5,703.139
## -----
```

Table 3: Average holdout churn predictive accuracy for different estimation methods

```
##
## Average holdout churn predictive accuracy for different estimation methods (2 iterations)
## =====
##                               Gini Coefficient Top Decile Lift
## -----
## Classic Loss                  0.191                1.843
## Reordered Classic Loss        -0.169                0.745
## Uplift Model                  0.178                1.412
## Our Approach                  0.157                1.400
## -----
```

Figure 2: Average holdout campaign profit as a function of target size for different estimation methods

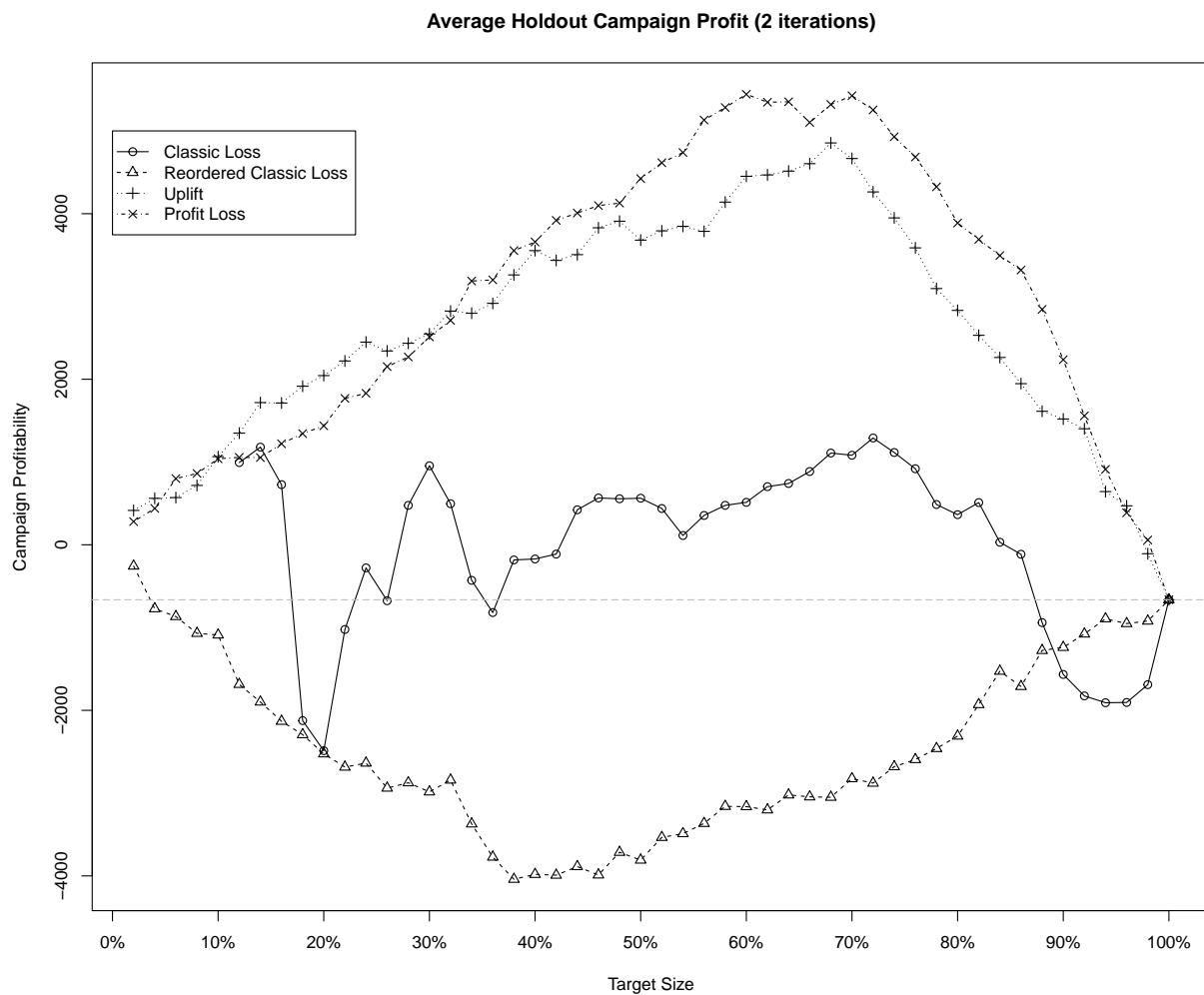


Figure 3: Average holdout campaign profit as a function of target size for different weighting schemes

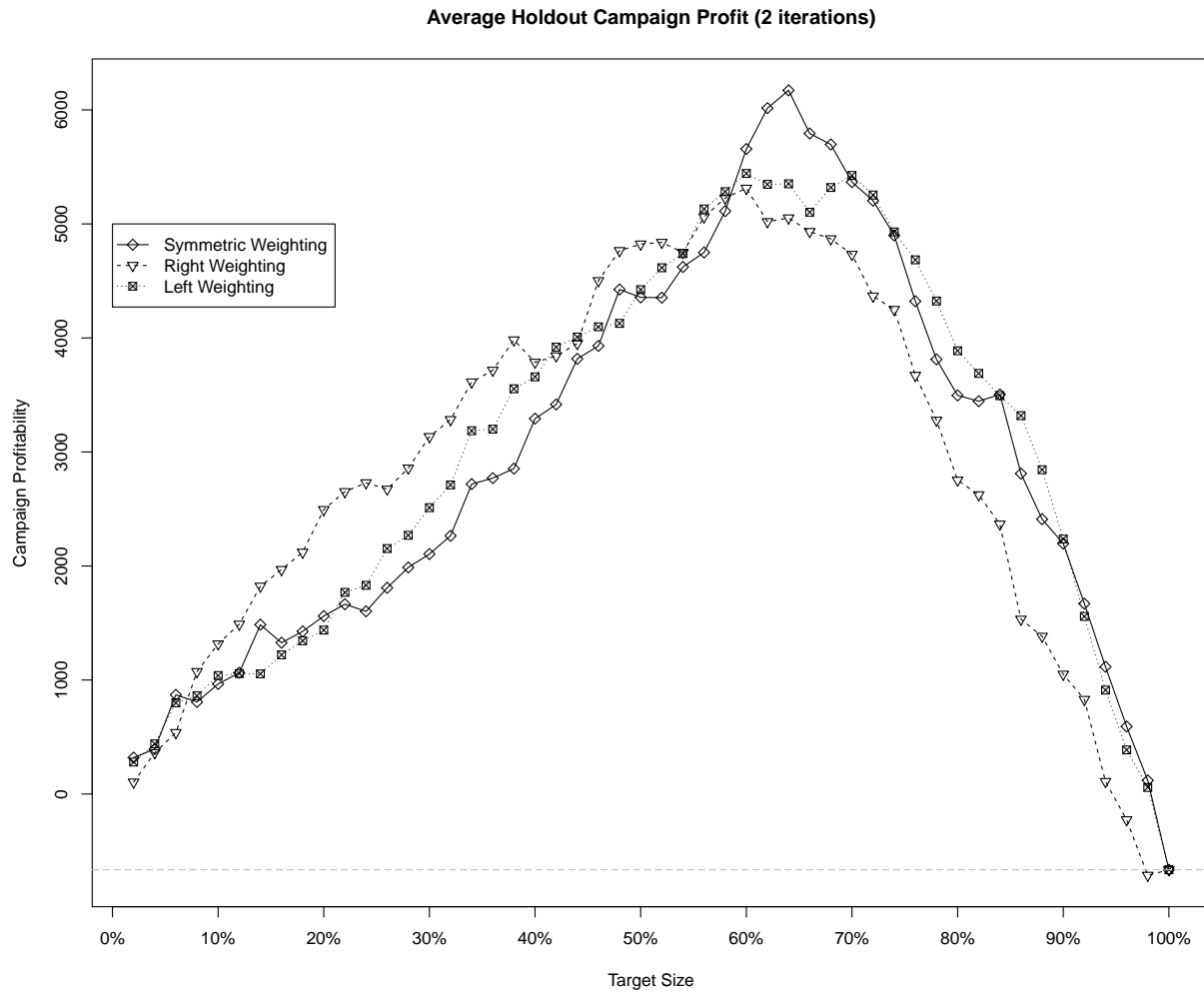


Figure 4: Average percentage customers overlapping for different estimation methods

