Report 3
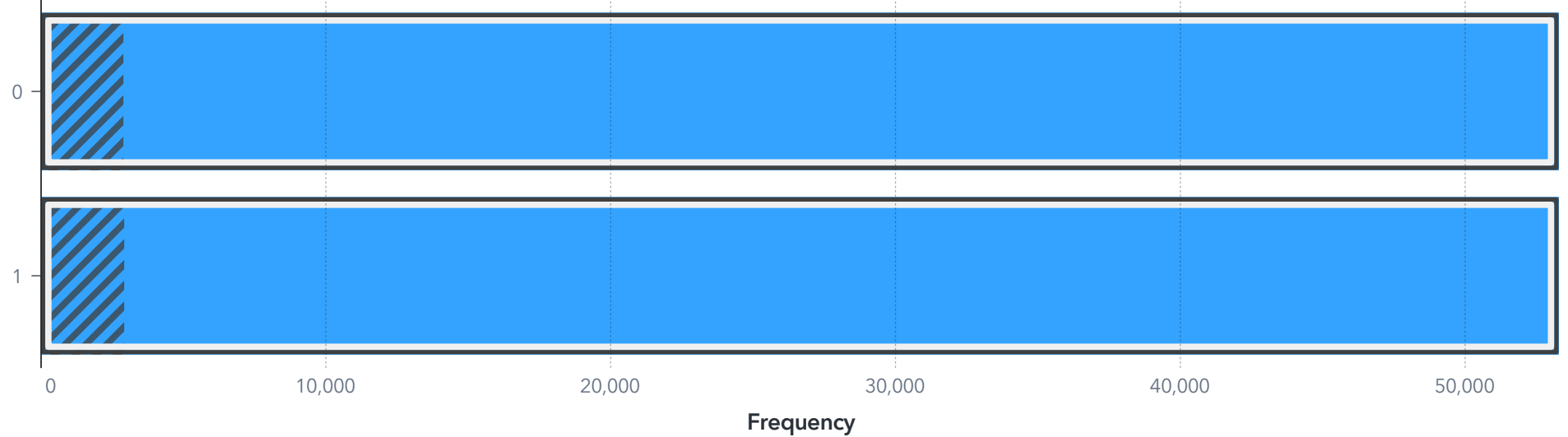
Creation Date: Thursday, 4 May 2023 15:28:44
Author: ayush.tankha@essec.edu

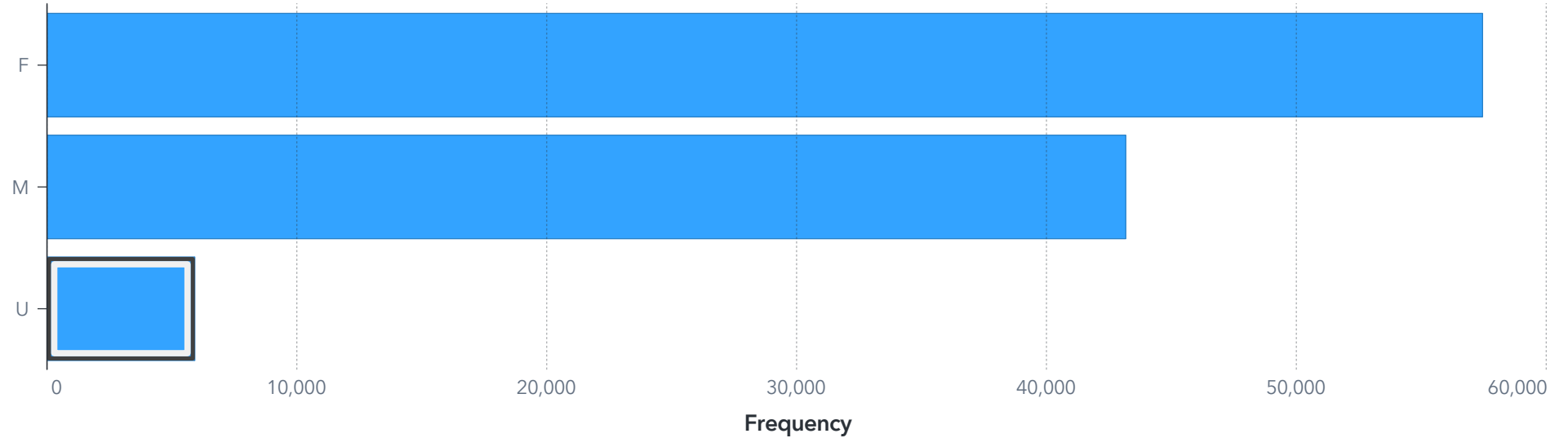## Frequency of Target Gift Flag

Target Gift Flag

Frequency

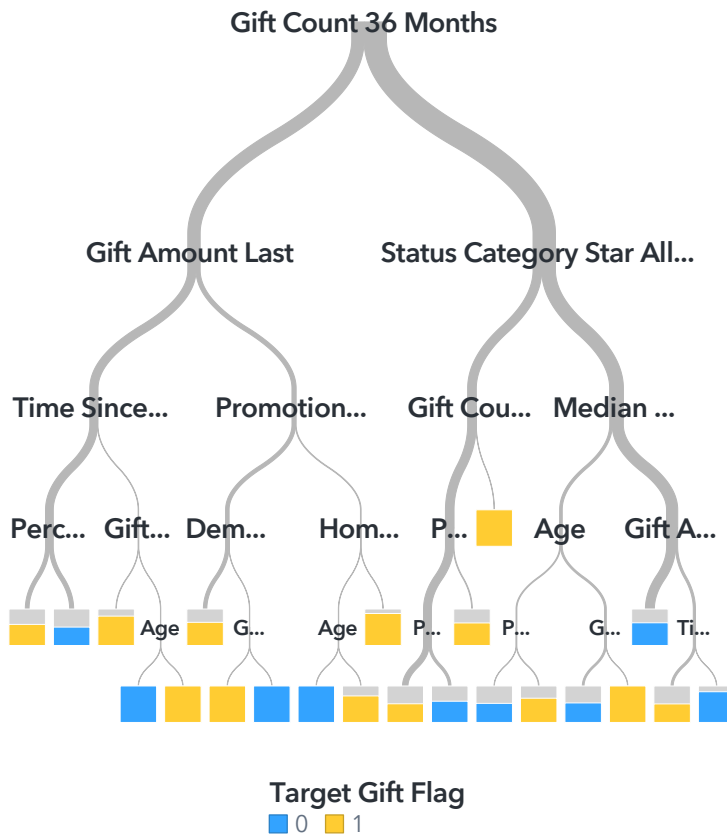## Frequency of Gender

Gender

Frequency

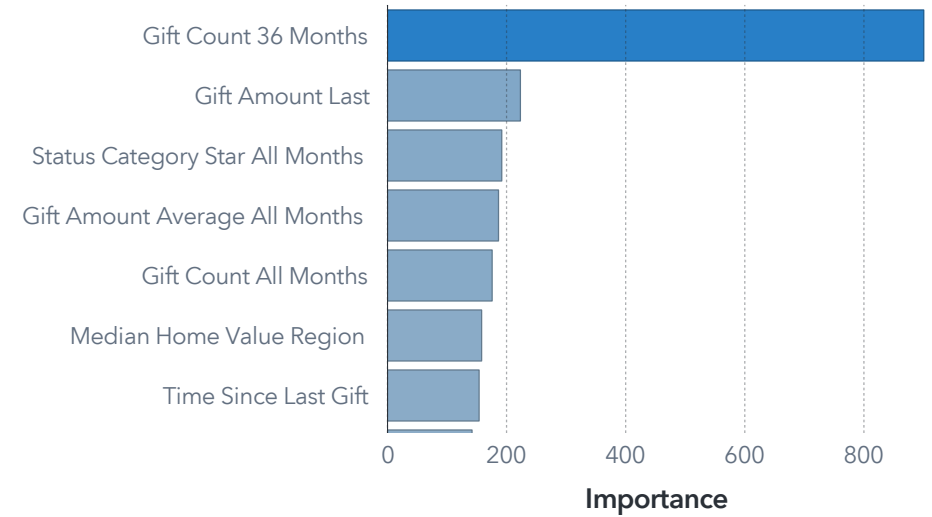# Decision Tree

Decision Tree   **Target Gift Flag**   (event=1)   KS (Youden)   **0.1639**   Observations Used   **106,546**

Tree

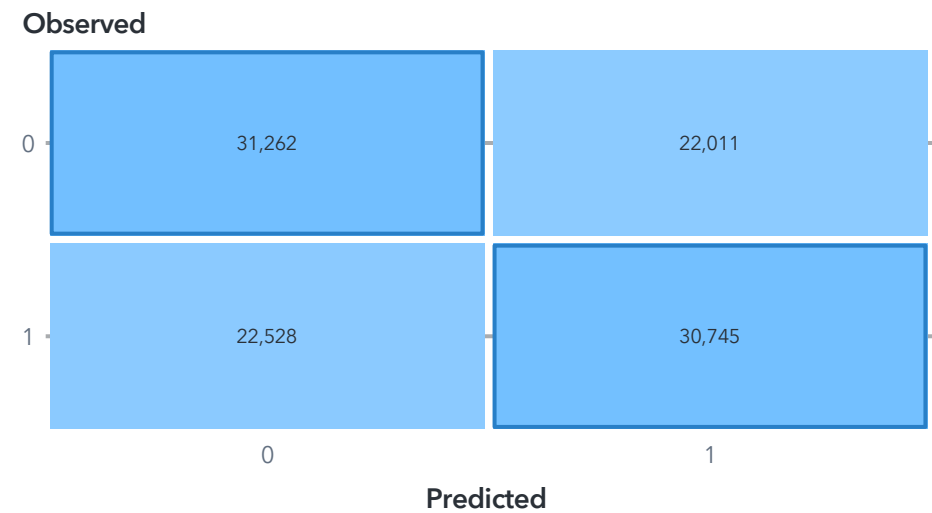**Target Gift Flag**
■ 0 ■ 1

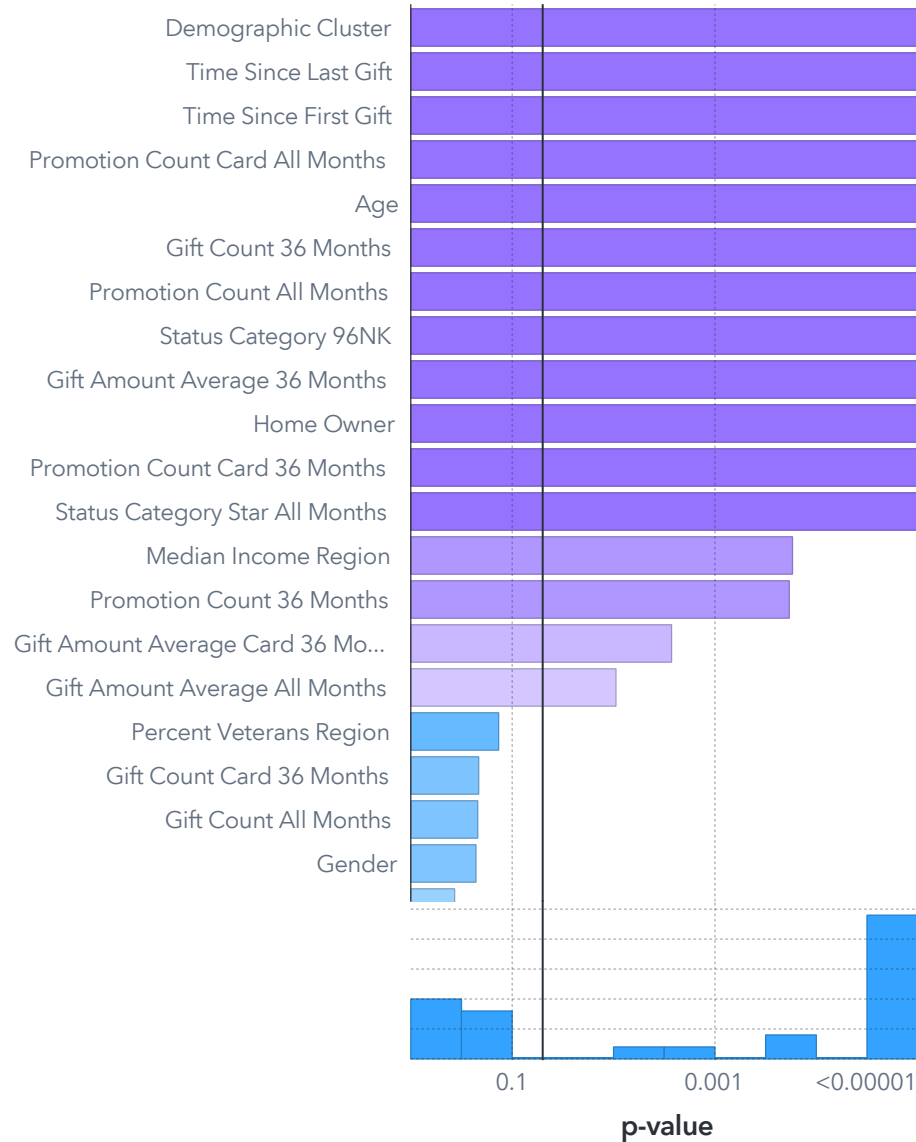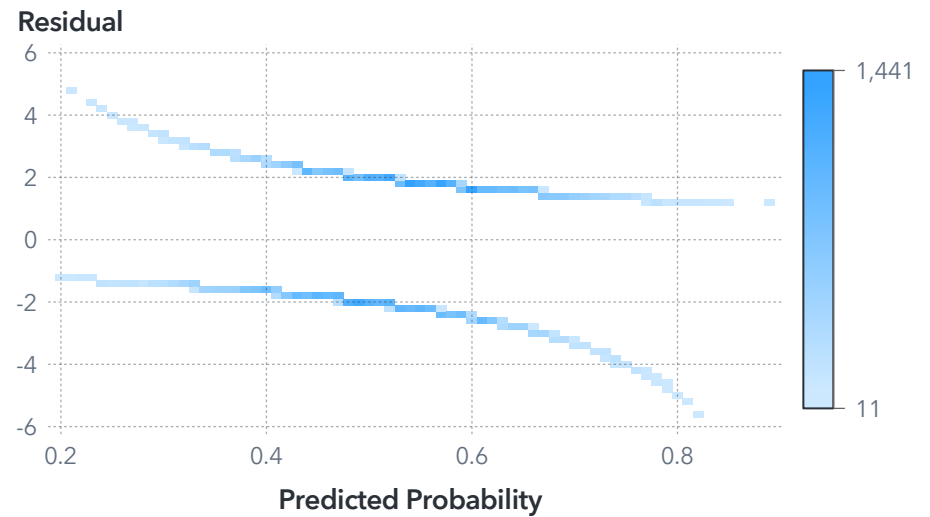## Variable Importance

Confusion Matrix

Logistics Regression

Logistic Regression **Target Gift Flag** (event=1) KS (Youden) **0.1863** Observations Used **64,988** Unused **41,558**
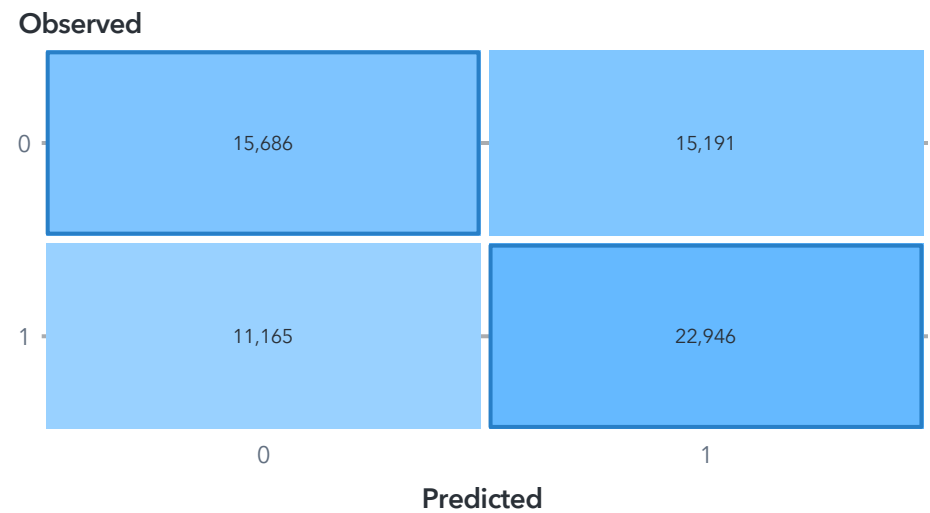
Fit Summary

Variable
Demographic Cluster
Time Since Last Gift
Time Since First Gift
Promotion Count Card All Months
Age
Gift Count 36 Months
Promotion Count All Months
Status Category 96NK
Gift Amount Average 36 Months
Home Owner
Promotion Count Card 36 Months
Status Category Star All Months
Median Income Region
Promotion Count 36 Months
Gift Amount Average Card 36 Mo...
Gift Amount Average All Months
Percent Veterans Region
Gift Count Card 36 Months
Gift Count All Months
Gender

p-value axis: 0.1   0.001   <0.00001

p-value

Residual Plot

Residual

axis values: 6, 4, 2, 0, -2, -4, -6

Predicted Probability axis: 0.2, 0.4, 0.6, 0.8

Color scale: 1,441 (top) to 11 (bottom)

Predicted Probability

Confusion Matrix

Observed

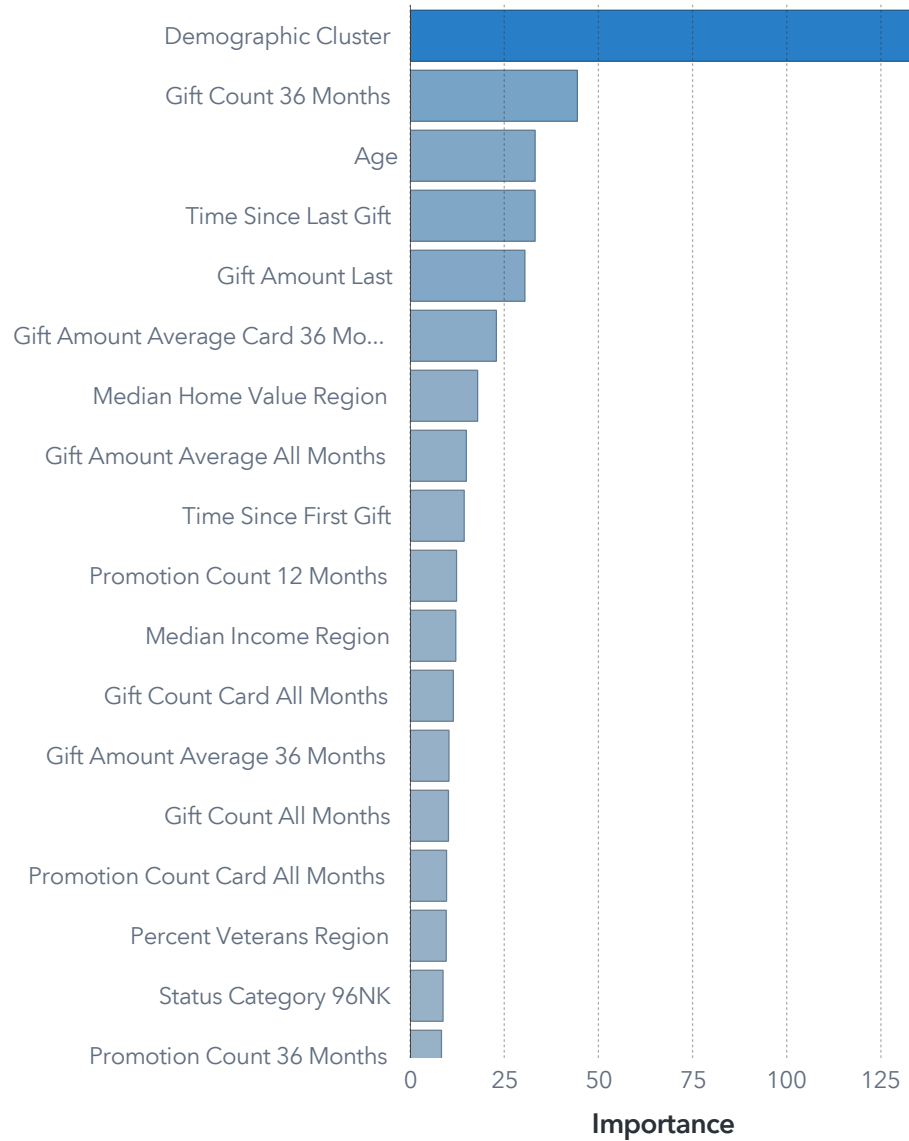|	Predicted 0	Predicted 1
0	15,686	15,191
1	11,165	22,946

Predicted

Gradient Boosting

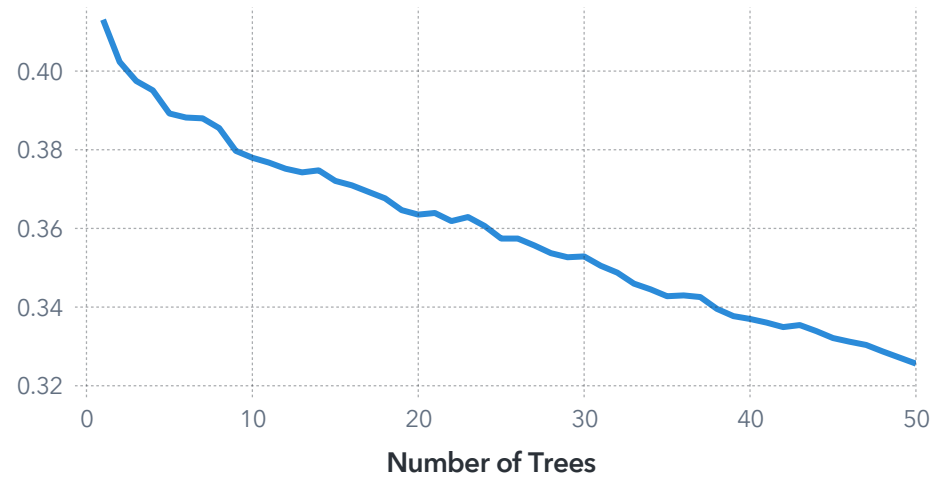*Gradient Boosting* **Target Gift Flag** (event=1) KS (Youden) **0.3488** Observations Used **106,546**
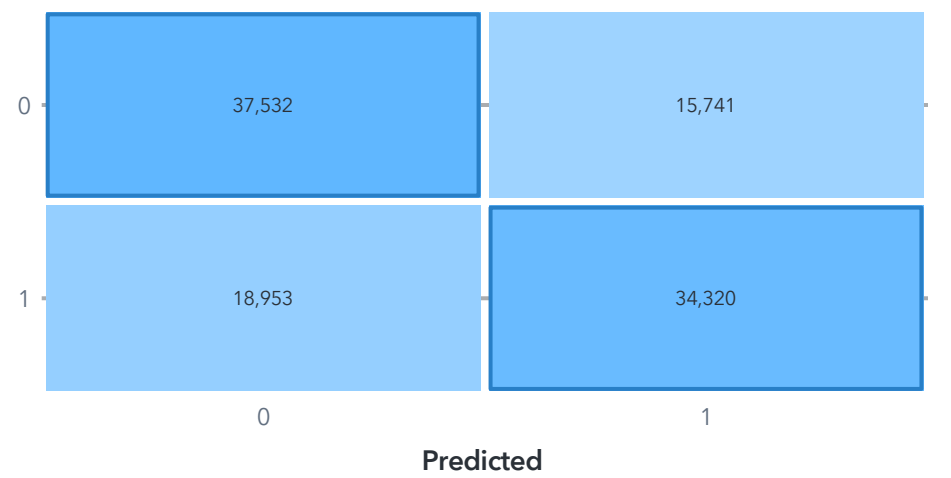
Variable Importance

Variable	Importance
Demographic Cluster	
Gift Count 36 Months	
Age	
Time Since Last Gift	
Gift Amount Last	
Gift Amount Average Card 36 Mo...	
Median Home Value Region	
Gift Amount Average All Months	
Time Since First Gift	
Promotion Count 12 Months	
Median Income Region	
Gift Count Card All Months	
Gift Amount Average 36 Months	
Gift Count All Months	
Promotion Count Card All Months	
Percent Veterans Region	
Status Category 96NK	
Promotion Count 36 Months	

Iteration Plot

Misclassification Rate

Confusion Matrix

Observed

Predicted	0	1
0	37,532	15,741
1	18,953	34,320

Neural Network

Network

Network diagram

Objective / Loss

Iteration Plot with Objective and Loss curves over Iterations (0 to 60), y-axis from 2.75 to 4.00.

Legend: Objective, Loss

Confusion Matrix

Observed

	Predicted 0	Predicted 1
0		30,877
1		34,111

Predicted
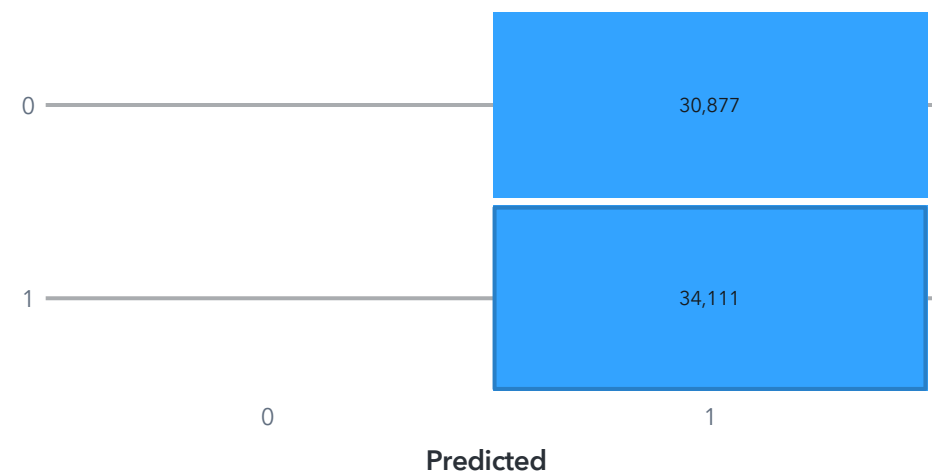
Legend:
- Neuron Absolute Average: 0.0002 — 0.0000
- Weight: -0.00 — 0.00
- Neuro...
- Link Absolute: 0.0002 — 0.0000
- Link: -0.00 — 0.00
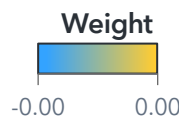
5
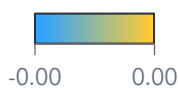
Model Comparison

Model Comparison   **Target Gift Flag**   (event=1)

Fit Statistic
KS (Youden)

Confusion Matrix
Observed

Model	Decision tree -...		Logistic regress...		Gradient boosti...		Neural network ...	
Observed 1	30,745	22,528	22,946	11,165	34,320	18,953	34,111	
Observed 0	22,011	31,262	15,191	15,686	15,741	37,532	30,877	
Predicted	1	0	1	0	1	0	1	0

⚠ A1.1
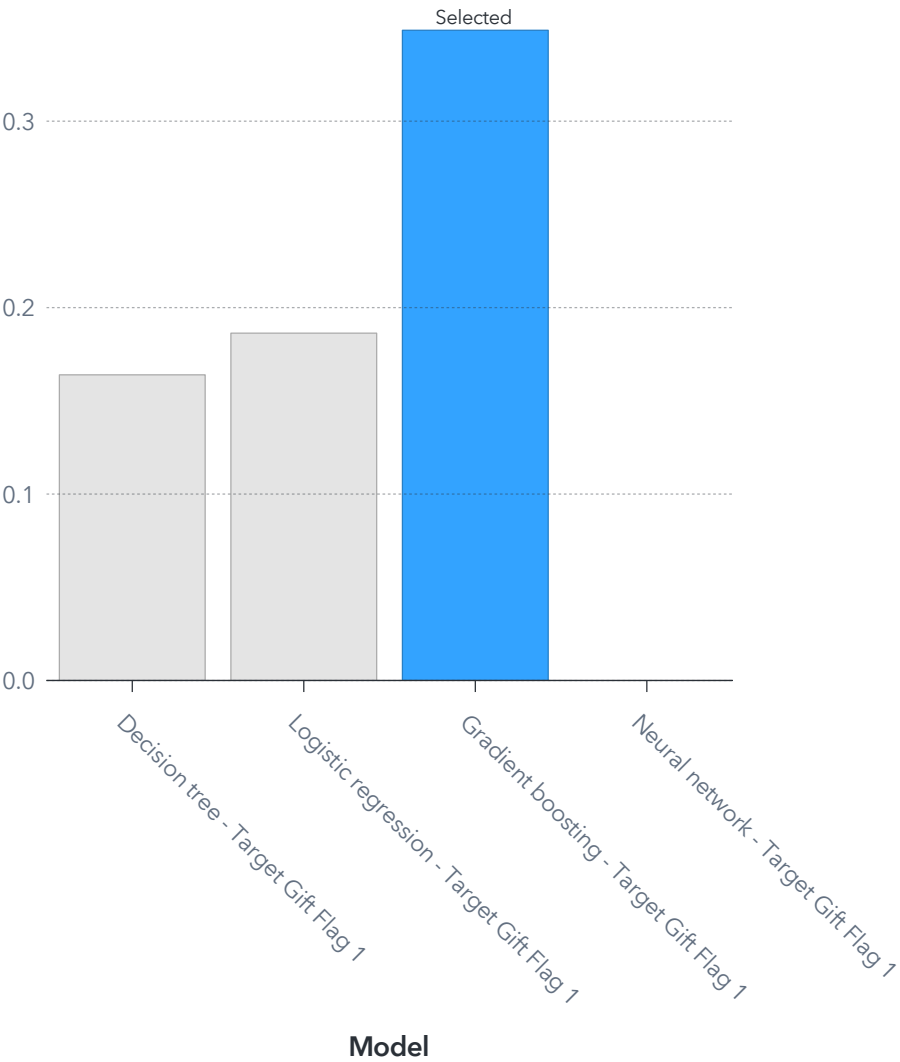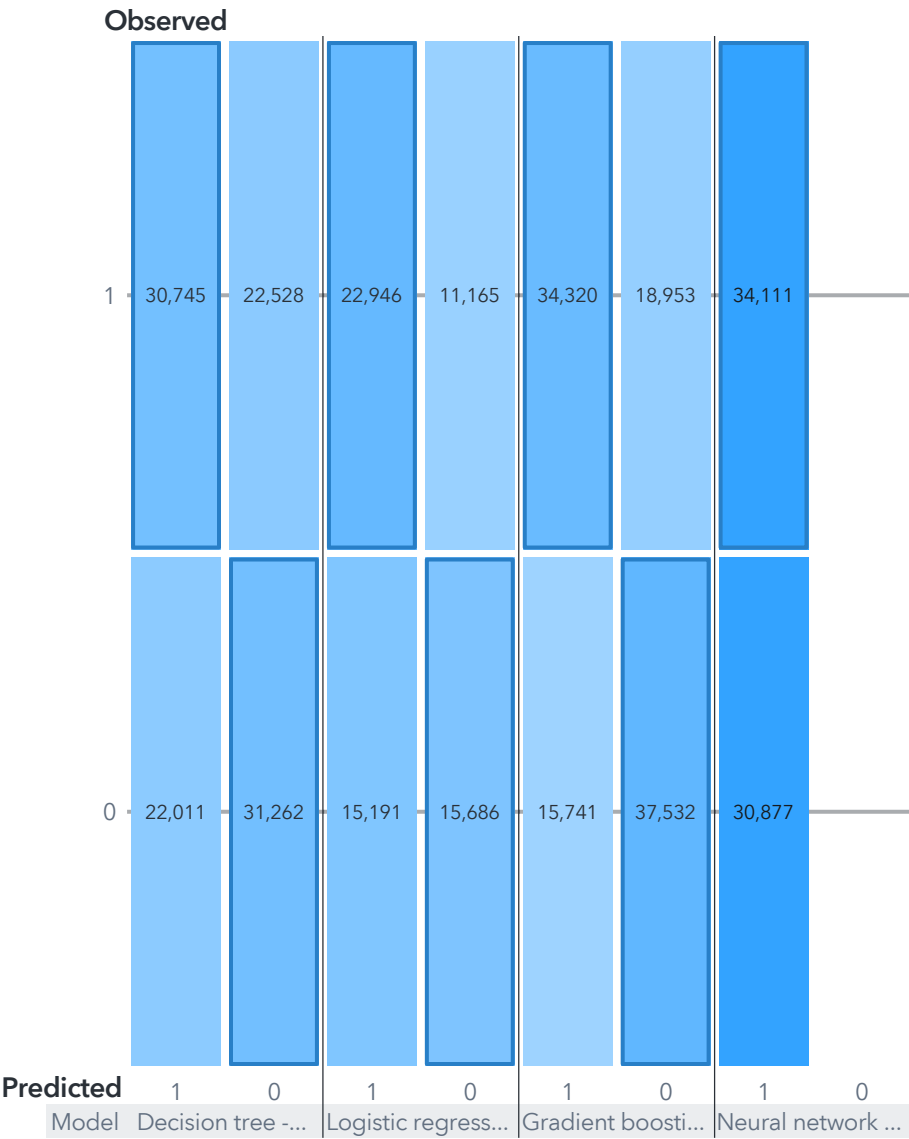
Appendix

Warnings: Neural network - Target Gift Flag 1: One or more of the neuron layers has too many neurons to display and has been truncated.
                   Number of observations for all models do not match.