Churn Modeling

Banking Sector

It costs five times more to acquire a new customer than it does to keep an existing one

—Bain & Company

Introduction

GOAL

- Predict likelihood a customer will churn before they do
- Increase profitability through customer retention

SOLUTION

- Construct a classification model
  - Exited vs. Retained

Background

DATA

- Kaggle dataset
    - 14 features with 10,000 rows
- Key features:
    - Age, Balance, # of Products, Is Active

MAXIMIZE CUSTOMER RETENTION

- Maximize recall
- Assumptions:
    - 5:1 Ratio for customer acquisition vs retention
    - $750 to acquire customer
    - $150 to retain customer

Baseline Model

DO NOTHING

- Lose 400 customers
- Lose $300,000

		Predicted	
		Retained	Exited
Actual	Retained	1600	0
	Exited	$\boxed{400}$	0

False Negative: 400*$750 = $300,000 Lost

Baseline Model

RETAIN ALL

- Overspend on 1600 customers
- Save 400 customers
- Break even

		Predicted	
		Retained	Exited
Actual	Retained	0	1600
	Exited	0	400

True Pos +False Pos:
2,000*$150 =
$300,000 Spent

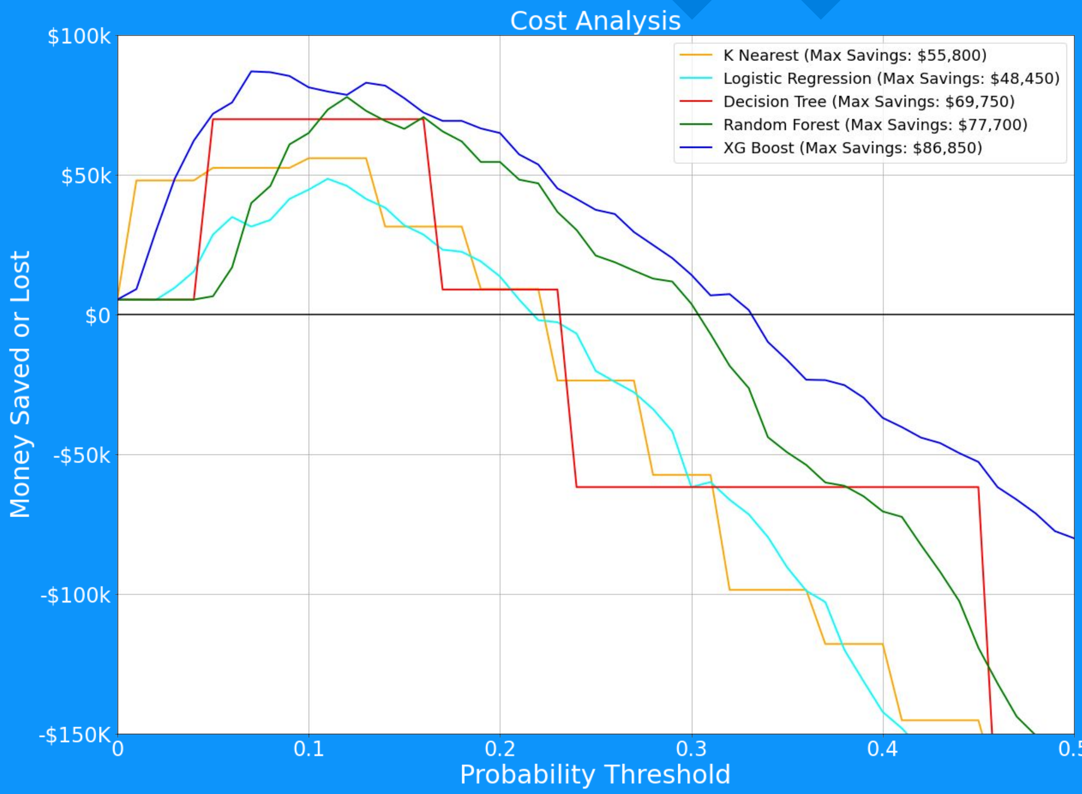
True Positives: 400*$750 = $300,000 Saved

Results

MODEL SELECTION

XG Boost Classifier

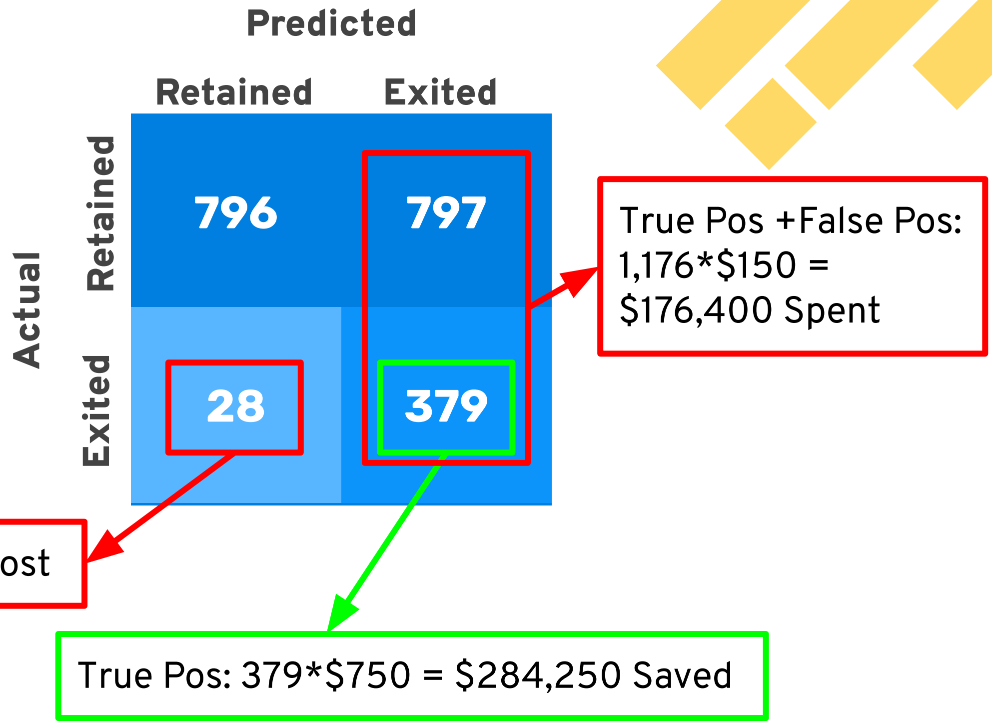
- $86,850 Savings



Results

XG BOOST MODEL

- Overspend on 797 customers
- Save 379 customers
- Loss 28 customers
- $86,850 Savings



Future Work

TARGET PROFITABLE CUSTOMERS

- Maximize precision
- Customer’s lifetime value
- Assumptions:
  - Profit margins on saving/checking 5%-20%
  - Higher account balance = more profit

Thanks!

Do You Have Any Questions?

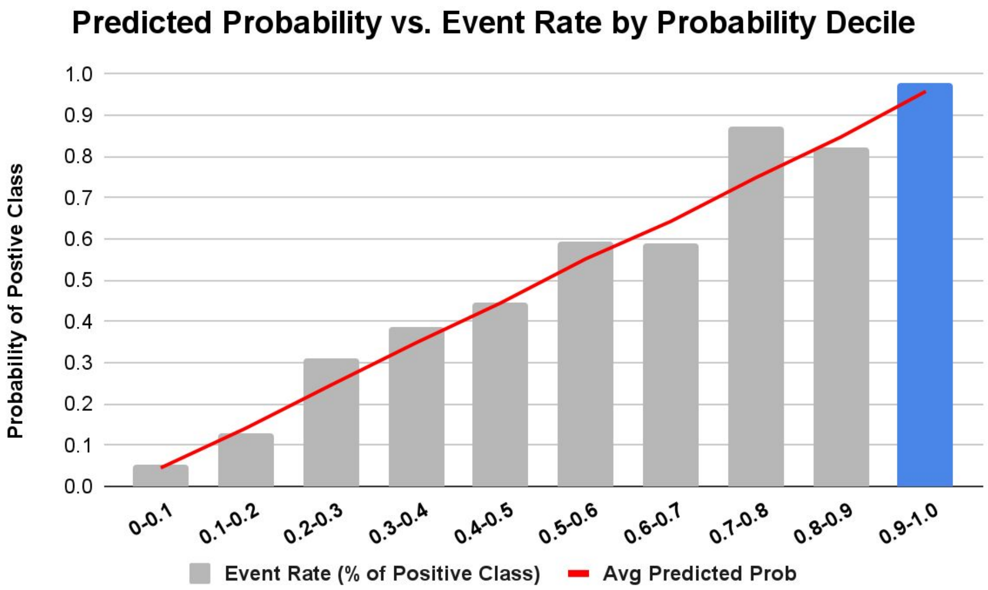
Appendix

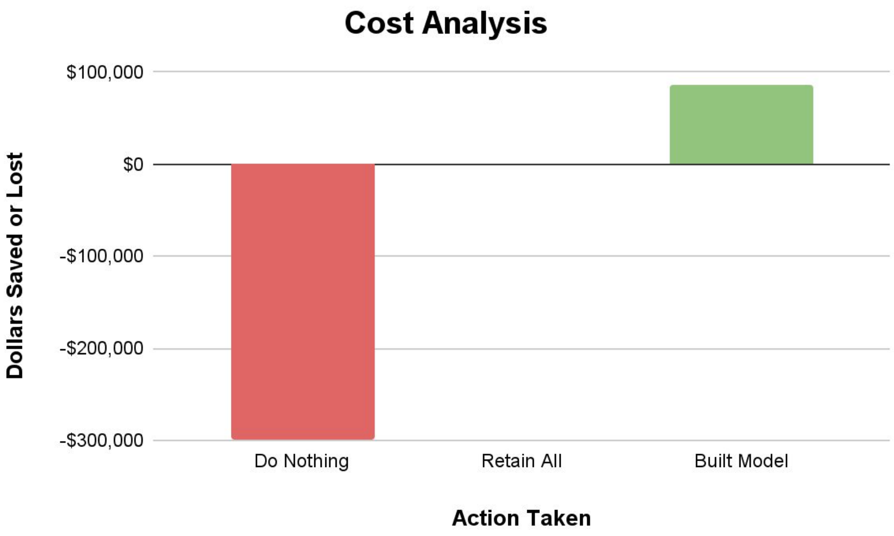
Target Profitable Customers

INCREASE THRESHOLD

PRO
- More certain in our classifications
- Decreased false positives

CON
- Increase number false negatives




Cost Analysis
$100,000
$0
-$100,000
-$200,000
-$300,000
Dollars Saved or Lost
Do Nothing
Retain All
Built Model
Action Taken

Target Profitable Customers

	Coefficients	Features
3	0.331589	NumOfProducts
5	0.166128	IsActiveMember
1	0.140150	Age
8	0.120134	Germany
7	0.074238	Male
11	0.064423	Zero
0	0.023757	CreditScore
6	0.022050	EstimatedSalary
9	0.021833	Spain
10	0.013632	Mid
2	0.012769	Tenure
4	0.009297	HasCrCard

Target Profitable Customers

	CreditScore	Age	Tenure	NumOfProducts	HasCrCard	IsActiveMember	EstimatedSalary	Male	Germany	Spain	Mid	Zero	Balance	CustomerId	Pred	Exited	binned
	376	29	4	4	1	0	119346.88	0	1	0	1	0	115046.74	15656148	0.998629	1	(0.9, 1.0]
	546	58	3	4	1	0	128881.87	0	1	0	1	0	106458.31	15640846	0.997863	1	(0.9, 1.0]
	469	52	8	3	0	0	150093.32	0	1	0	0	0	139493.25	15696989	0.994660	1	(0.9, 1.0]
	630	51	0	3	0	0	88372.69	0	1	0	1	0	108449.23	15592773	0.994600	1	(0.9, 1.0]
	521	52	5	3	0	0	53793.10	1	1	0	1	0	116497.31	15701602	0.993649	1	(0.9, 1.0]
	533	49	1	3	1	0	69409.37	0	1	0	1	0	102286.60	15727317	0.993133	1	(0.9, 1.0]
	547	55	4	3	1	0	16922.28	1	1	0	1	0	111362.76	15589017	0.992926	1	(0.9, 1.0]

Target Profitable Customers

Customer ID	Age	Number of Products	Is Active Member	Balance	Prediction of Churn
15589017	55	4	0	$111,362	99.2%
15689341	50	3	0	$0	99.2%