

# Predicting Customer Churn

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 Microsoft Azure



## Agenda

- Student Credentials
- The Problem
- Methodology
- Conclusions & Suggestions



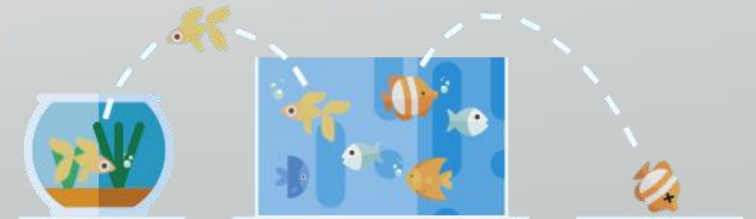
# The Problem


- Companies lose \$1.6 trillion per year due to customer churn!
- It costs 5 times more to acquire new customers than retaining an existing one
- The more customers a business retains, the more revenue it makes!
- Customers at high risk of churning, represent a huge additional potential revenue source



Analyze and predict customer churn

CUSTOMER CHURN





“There is a big difference between a satisfied customer  
and a loyal customer.”

*Shep Hyken*

“If your customer retention is poor then nothing else  
matters.”

*Brian Balfour*

# Methodology

Data  
Processing

- Data Acquisition
- Data Wrangling
- Feature Engineering

Model  
Building

- Data Splitting
- Model Training
- Feature Importance
- Model Scoring

Model  
Evaluation

- Confusion Matrix
- Performance Measurements

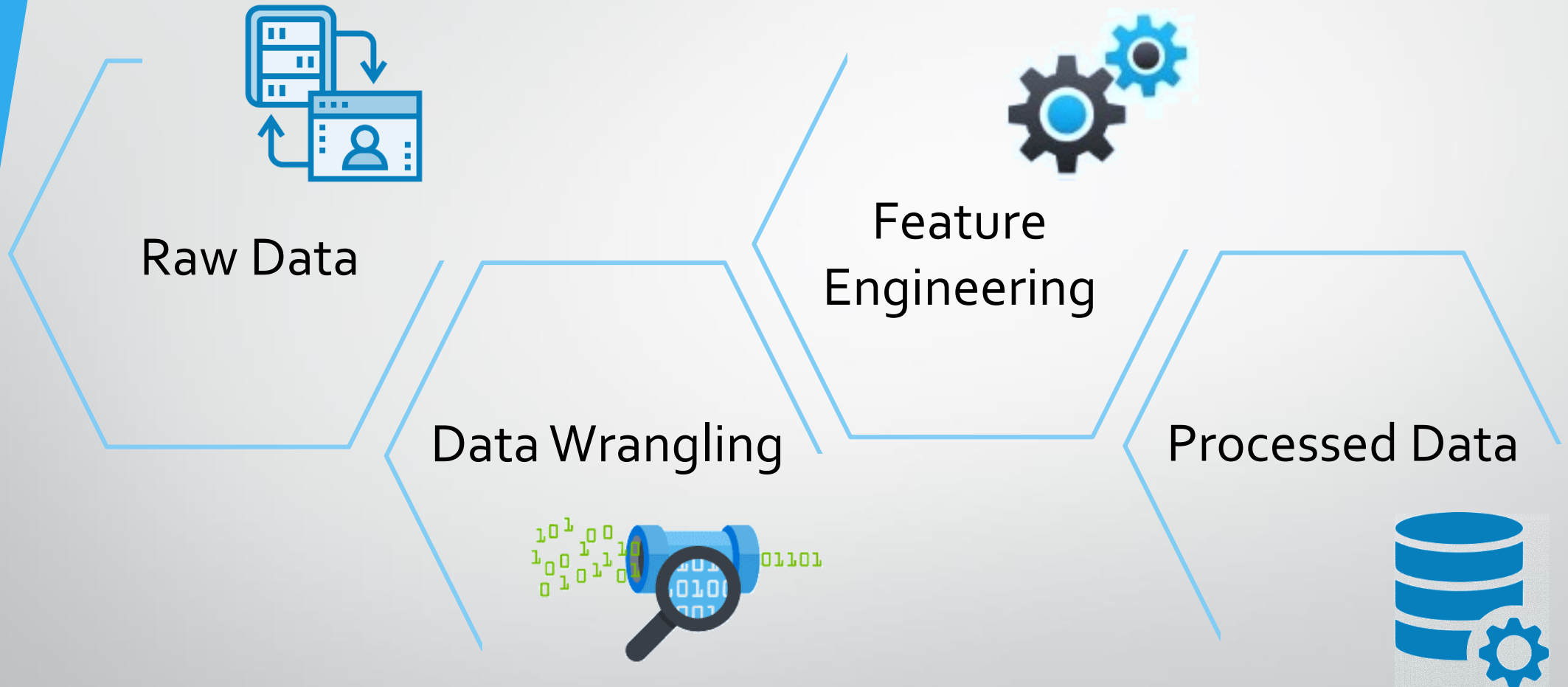
Model  
Deployment

- Batch Inference

Conclusions

- Results
- Suggestions

# Data Processing



# Features Used



- Number of times a customer collected (Sum\_collect\_points)
- Total collected points (Sum\_collect\_points)



- Number of times a customer redeemed (Sum\_redeem)



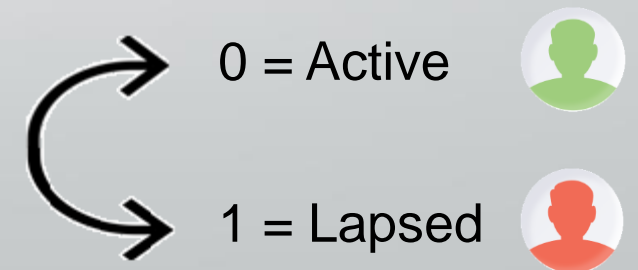
- Years passed since customer's registration to the program (Years\_in\_the\_program)



- Months passed since customer's last action (Months\_since\_last\_transaction)



- ✓ Target Feature: Customer's lapsed status (State)





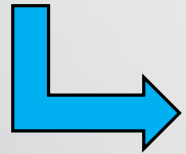
# Model Building

## Data Splitting:

- 80% training, 20% testing
- Stratified sampling based on target variable (i.e. State)

## Model Training:

- Binary classification problem (Active, Lapsed)



## **Two-Class Boosted Decision Tree**





# Model Building

## Two-Class Boosted Decision Tree:

- ✓ Non-parametrical method
- Classify customers to active & lapsed
- Hyper-parameter tuning
- Feature Importance
- Score Model
- Model Evaluation
- Model Deployment

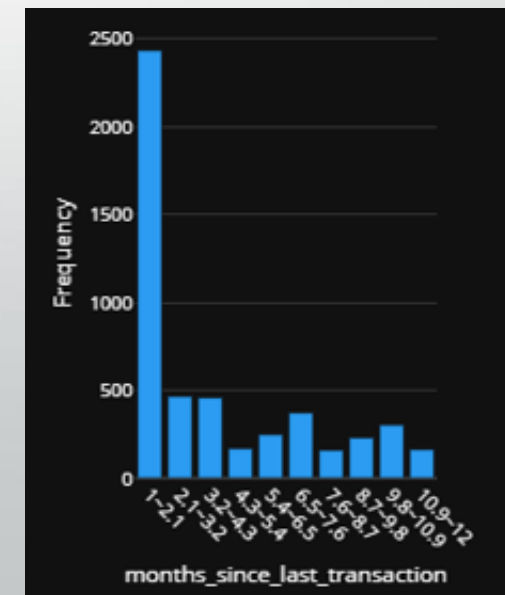
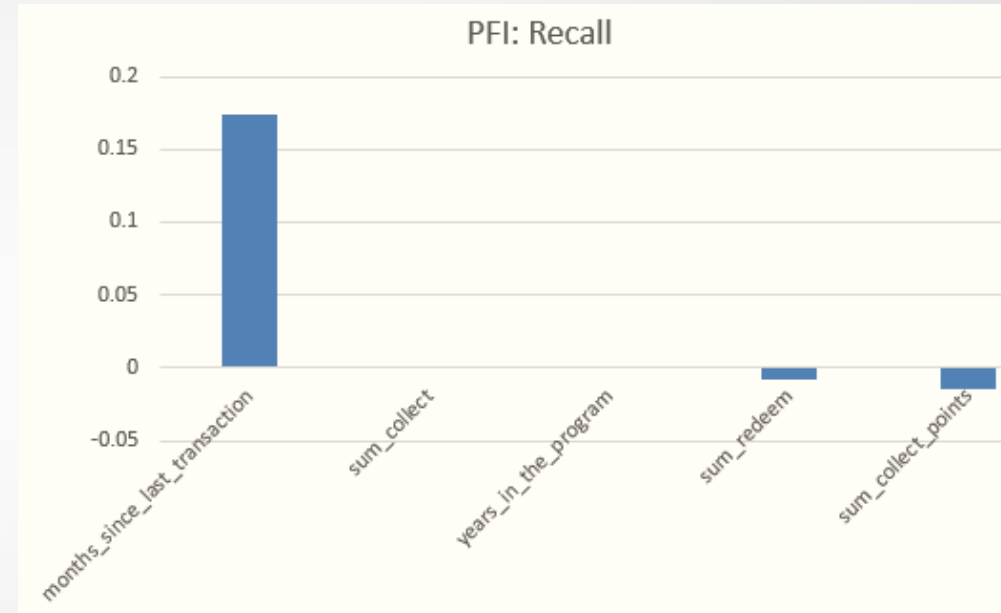
Hyper-parameters	Values
Maximum number of leaves per tree	20
Minimum number of samples per leaf node	10
Learning rate	0.2
Number of trees constructed	300

# Permutation Feature Importance

- ❖ More customers lapsed identified, more unnecessary retention costs saved

↳ Main performance metric used: **Recall**

- Month's passed since customer's last action
  - ✓ Most important feature for classification
  - ✓ Most customers collected or redeemed points less than 2 months ago
- All other features seem to have insignificant effect



# Model Evaluation

From confusion matrix:

- ✓ Good classifier (values accumulated on the diagonal)

From other typical performance metrics:

- ✓ High accuracy, precision, recall, AUC

<b>Accuracy</b>	81.7% (of customers correctly classified)
<b>Precision</b>	81.5% (of predicted lapsed customers correctly classified)
<b>Recall</b>	82% (of actual lapsed customers correctly classified)
<b>AUC</b>	.895 (higher the AUC, better the classifier)

		Actual	
		Lapsed	Active
Predicted	Lapsed	409	93
	Active	90	408

- ✓ Good classification model (will generalize well to out-of-sample data)

# Model Deployment

- Deploy model to a given batch of observations
- Use model to generate customer predictions (active, lapsed in the next 12 months ) based on their previous behavior

sum_collect	sum_redeem	sum_collect_ points	years_in_the_ program	months_since_last_t ransaction	Scored Labels	Scored Probabilities
13	0	1,269	19	1	0	.0071
6	0	2,890	10	10	1	.9998
2	0	422	7	9	1	.9999
7	1	2,690	16	1	0	.0144
7	0	211	2	3	0	.4053

Customers whose last action (collection or redemption) was:

- more than 9 months ago, have a huge probability to lapse (more than 99%).
- one month ago, have a very small probability to lapse (about 1%).

# Conclusions

- About 1 out of 2 customers were lapsed customers
- 82% of the lapsed customers correctly identified via the model
- Months passed since customer's last action was the only feature that revealed an evident pattern for customer churn probabilities (also suggested from PFI technique)
- The fewer the months passed without a transaction the more loyal the customer
- The best customers are those who are active on a monthly basis
- Customers who are active quarterly are at a high risk of churning

# Suggestions

- Keep the most loyal customers as satisfied as possible
- Reward the more active customers
- Provide incentives to customers who are active once per quarter or per trimester to prevent them from lapsing (e.g. discounts, special offers)
- Save retention costs from customers who are very likely to lapse
- ✓ Note: For a successful retention campaign, the decision threshold for identifying a lapsed customer should be decided by the management team or calculated from the profit matrix





**Thank you for your attention!**

