Credit Risk Prediction

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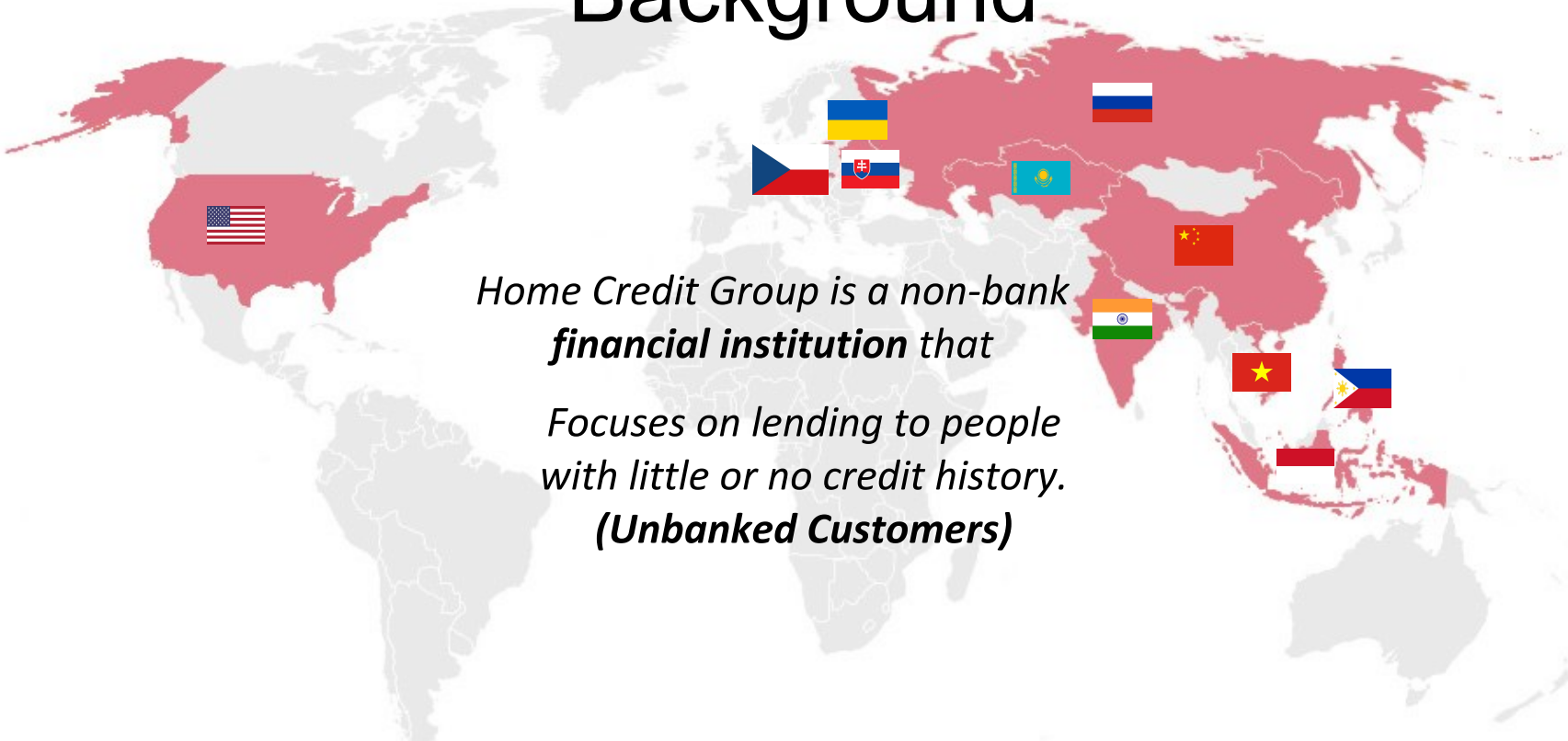
Background



Home Credit Group is a non-bank ***financial institution*** *that*

Focuses on lending to people with little or no credit history. ***(Unbanked Customers)***

Unbanked Population Example

Just 31% of Vietnamese adults have bank accounts and more than 95% of payments are made with cash and gold, according to the government.

Source: Bloomberg News dated *28 May 2019, 17:36 GMT+8*

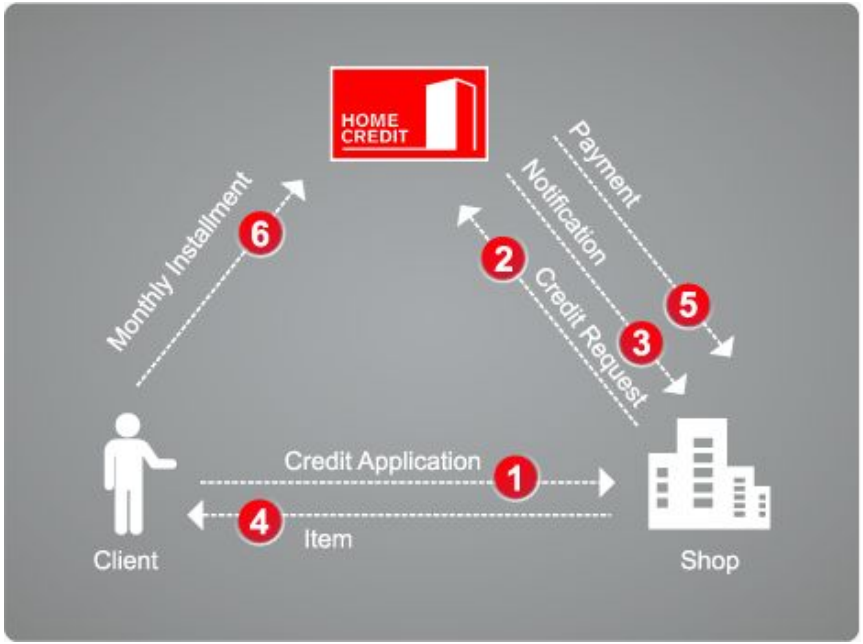
https://www.bloomberg.com/news/articles/2019-05-27/vietnam-s-next-revolution-a-cashless-society-for-the-masses

Business Model

1) Acquire new customers by targeting **unbanked population** who are purchasing durable goods at retail shops.

2) Offer them **credit facilities**:

- Revolving loans
- Cash loans



Problem Statement

- **Credit Scoring**
  - Customers mostly have low exposure to banking services.
  - Credit Bureau records are usually lacking/ non-existent.

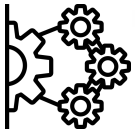
- **Predict clients' repayment abilities**
  - Can prediction be done accurately with alternate data like housing, telco and transactional information ?

Data Preprocessing

Data Cleaning

- Dropped Columns that has more than 60% null values
  (mostly housing features - year built, common area size etc.)
- Impute missing values with median as there are many outliers.

Data Integration



- Merged main dataset with credit bureau and other loans dataset.

Dataset Description

Data Integration

- Merged main dataset with credit bureau and other loans dataset.
- **340,000 unique users**
- **139 columns, 250 features after label and one-hot encoding**
  - ❖ Income, Loan Amount, Type of loan, Occupation, Housing features, Documents submitted, Credit Bureau data, etc.

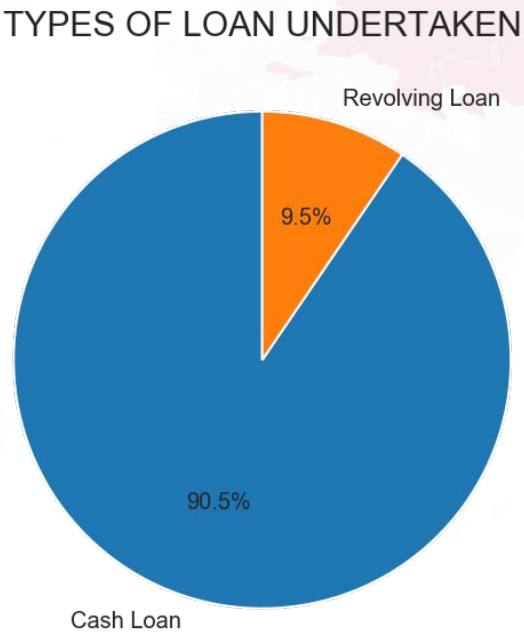
EDA - Class Imbalance

Binary Classification

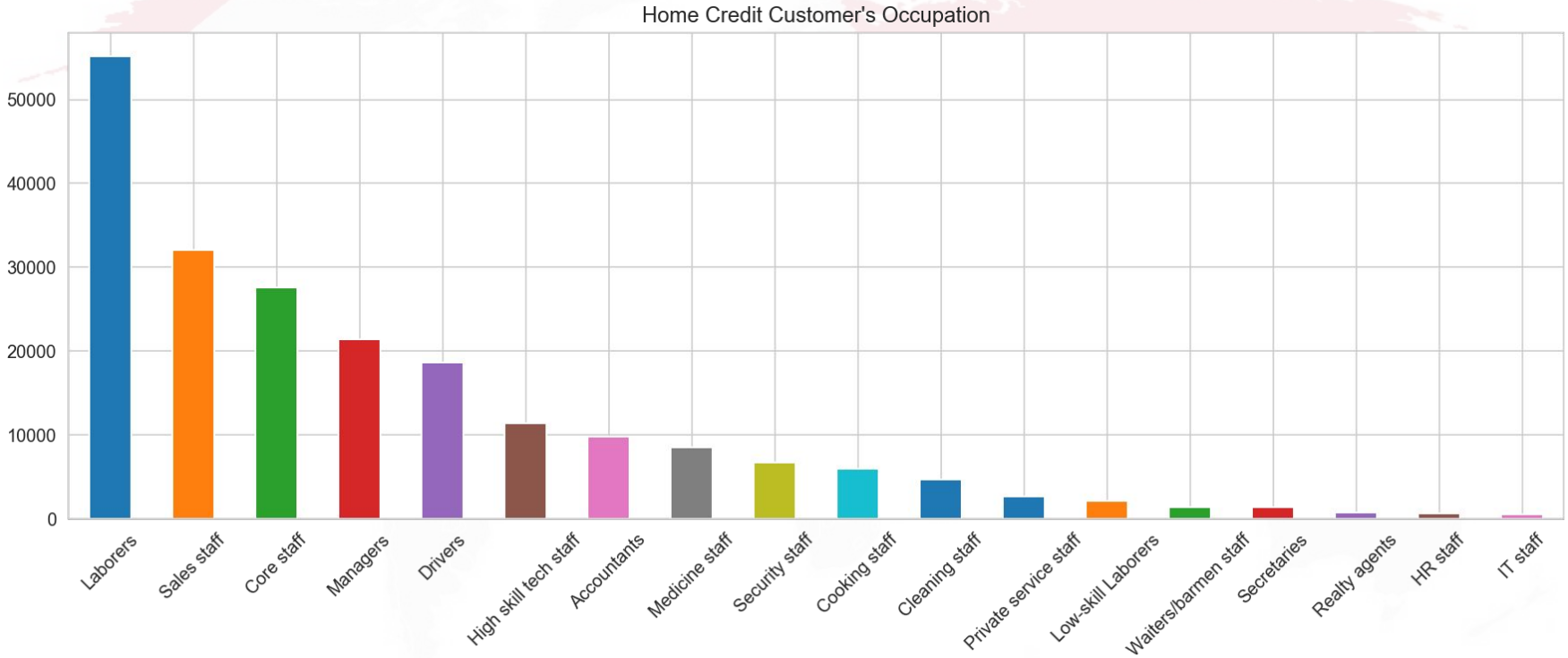
0: Successful Repayment (*282,686*)

1: Defaulted on loan (*24,825*)

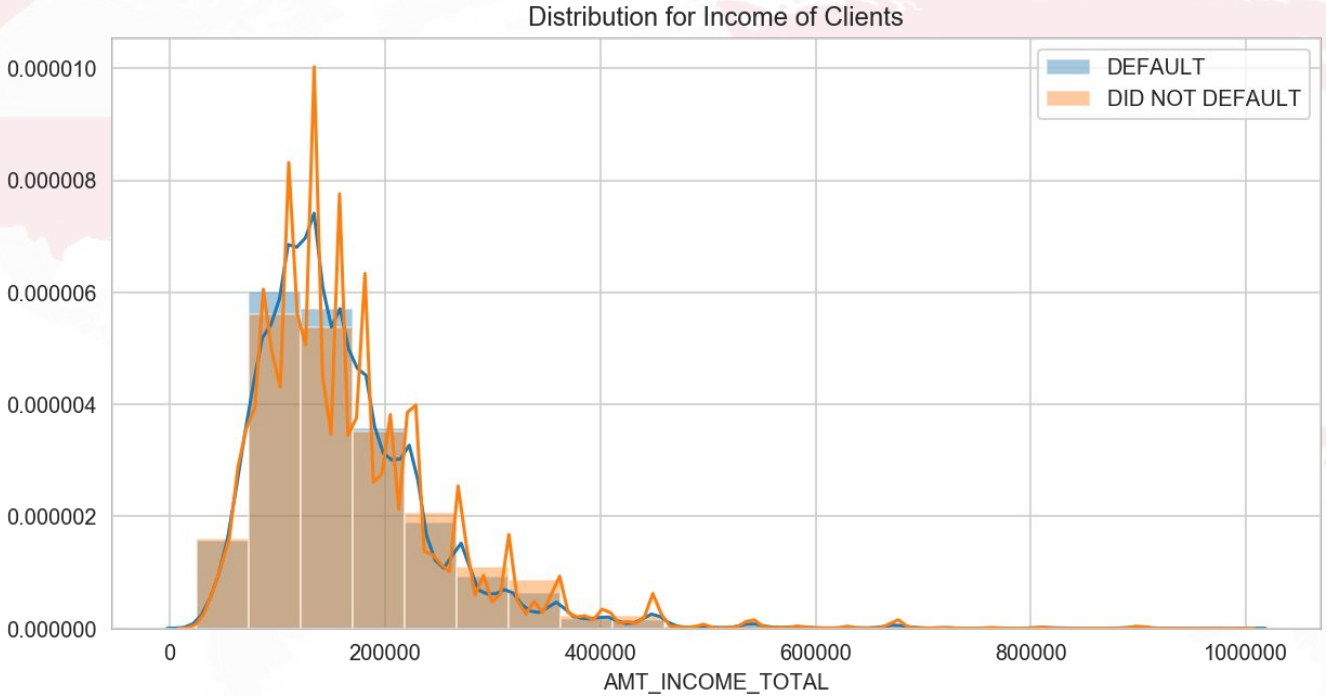
EDA - Loan Types



EDA - Occupation



EDA - Income Distribution



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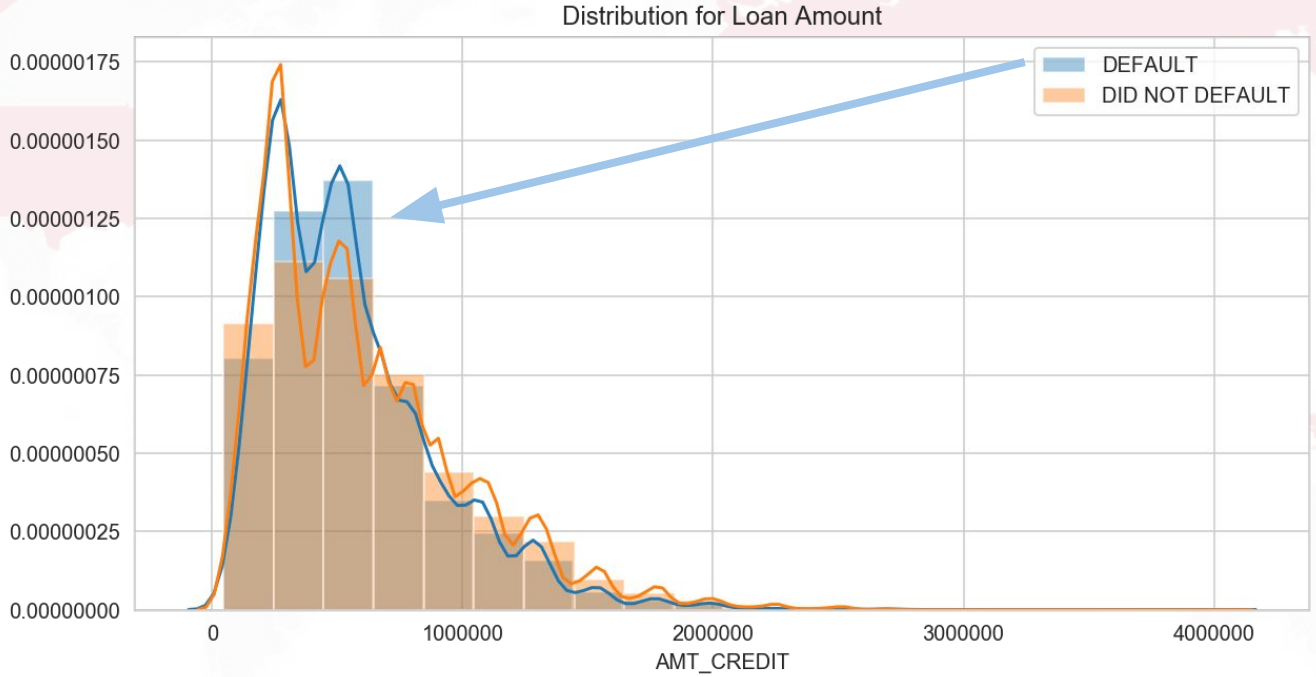
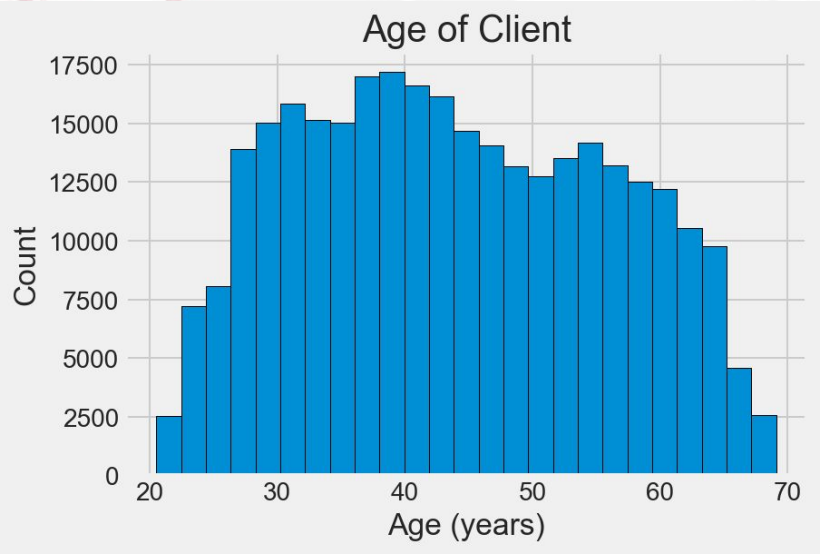
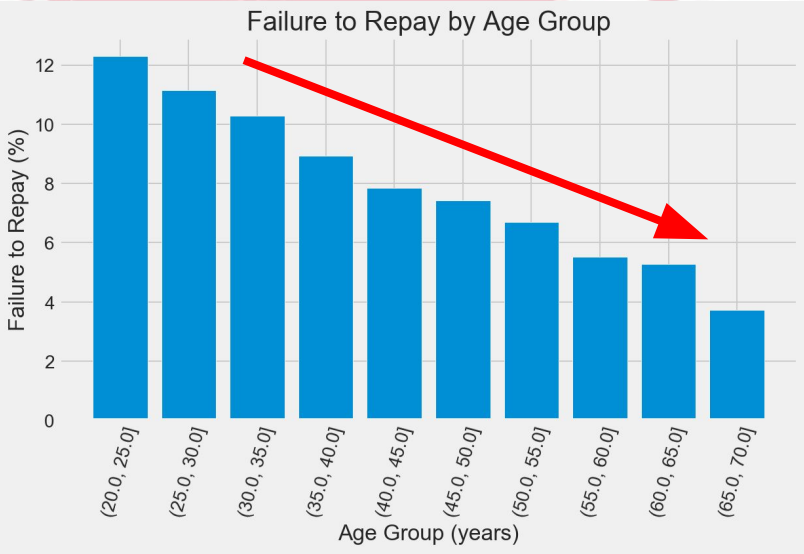
EDA - Loan Amounts

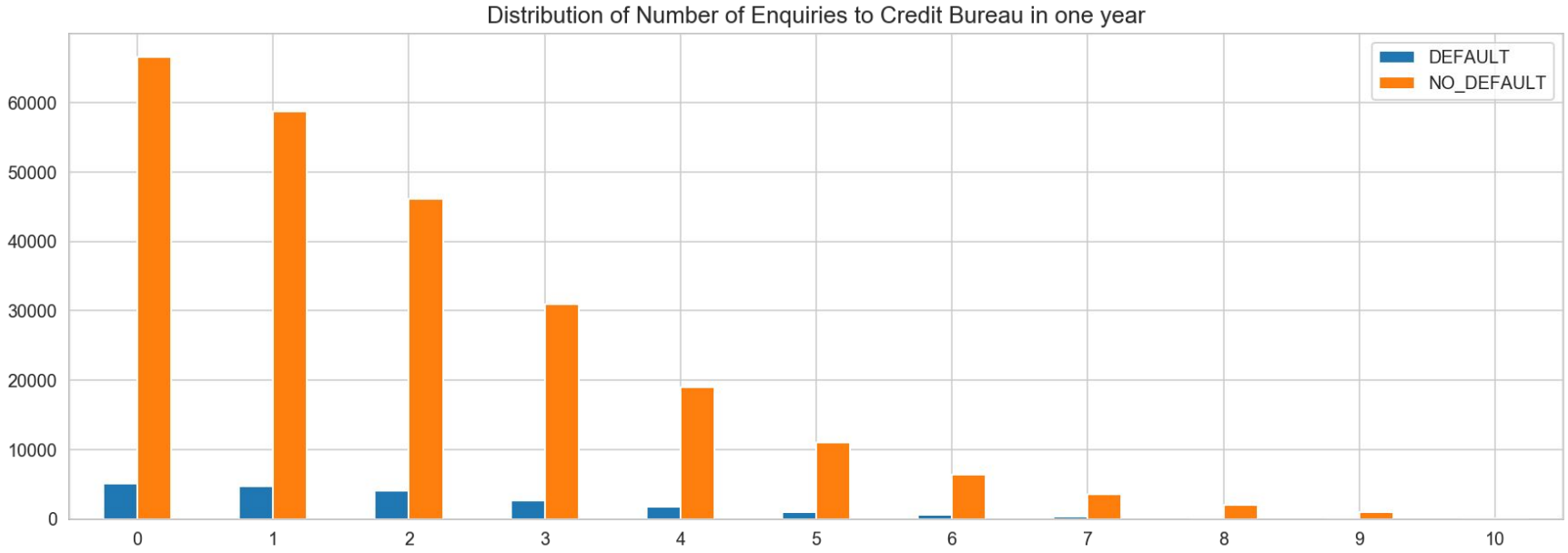


EDA - Client's Age and Failure to Repay





EDA - Credit Bureau Enquiries made in a year



Features Engineered

Feature	**Description**
credit_term	Loan Period
previous_loan_counts	Number of loans with Home Credit
other_loan_counts	Number of loans with other credit providers

Feature Selection

Attempted

RFECV	
SelectKBest	

Final Features : Top-down Manual Feature Elimination

Removed Collinear Variables	Pearson Correlation Coefficient > 0.9
Feature Importance Elimination	Removing features with lowest importance

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Project Goal:

Reduce the number of loan **rejections** for clients who were actually capable of repaying.

(Reducing Type I Error, False Positive)

Model Selection

Models\ Metrics	AUC-ROC (Kaggle Submission)	AUC-ROC	Precision
Logistic Regression	0.74	0.74	0.16
Random Forest	0.72	0.71	0.32
dmlc XGBoost	0.71	0.71	0.33
Yandex CatBoost	0.77	0.77	0.52
Ensemble with VotingClassifier	0.75	0.76	0.46

Yandex CatBoost

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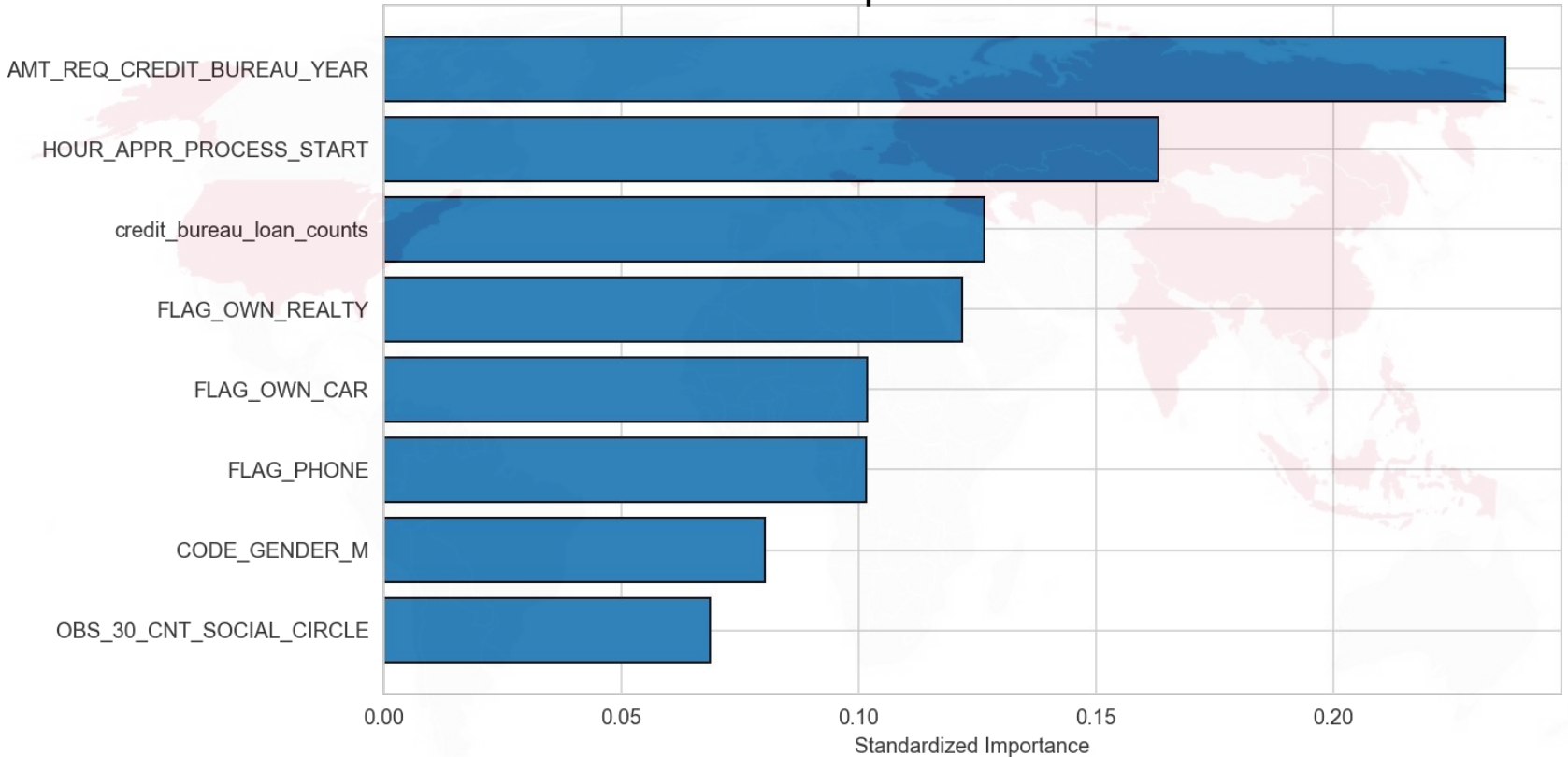
Feature Importance



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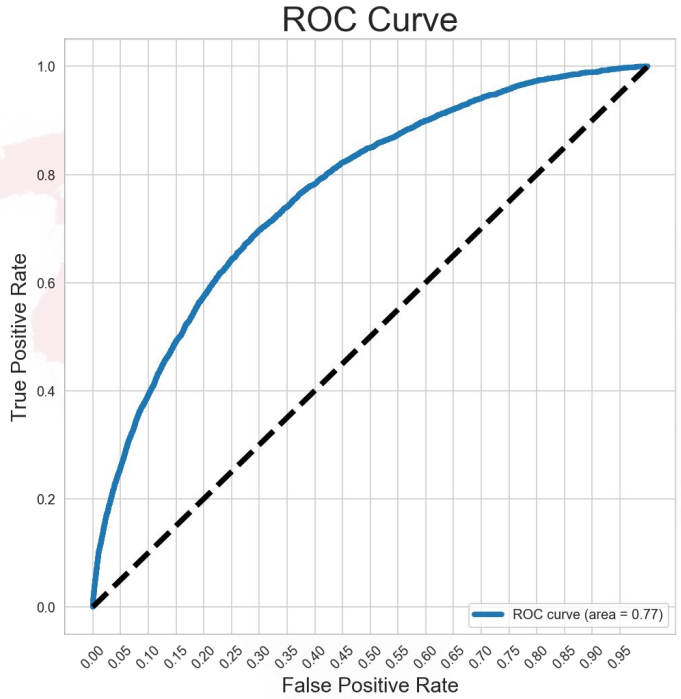
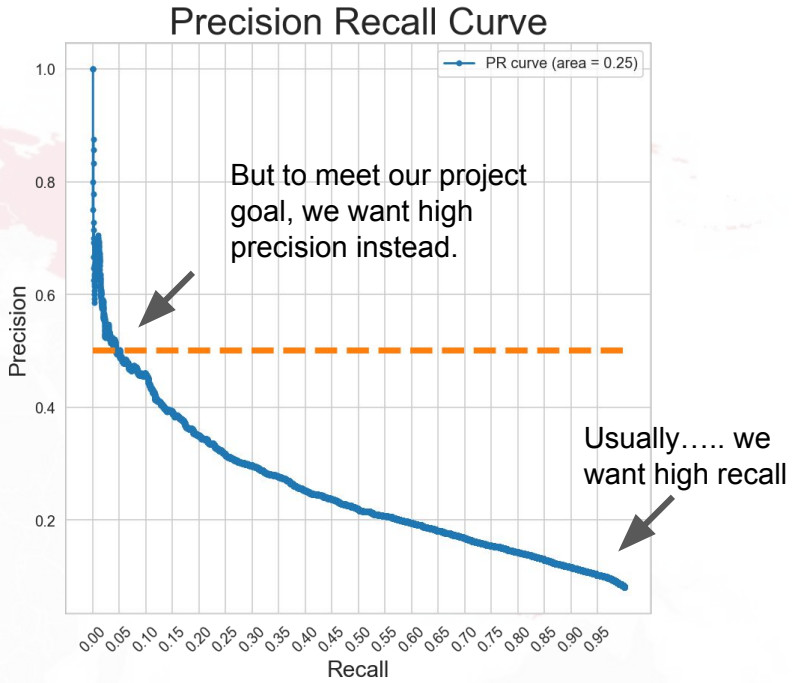


77% chance that model will be able to distinguish between positive class and negative class.
(Kaggle Competition Winner: 80%)



Trade-off: High Precision with Low Recall.

Number of loan defaults(bad debt) increases if we want to meet our goal of High Precision.

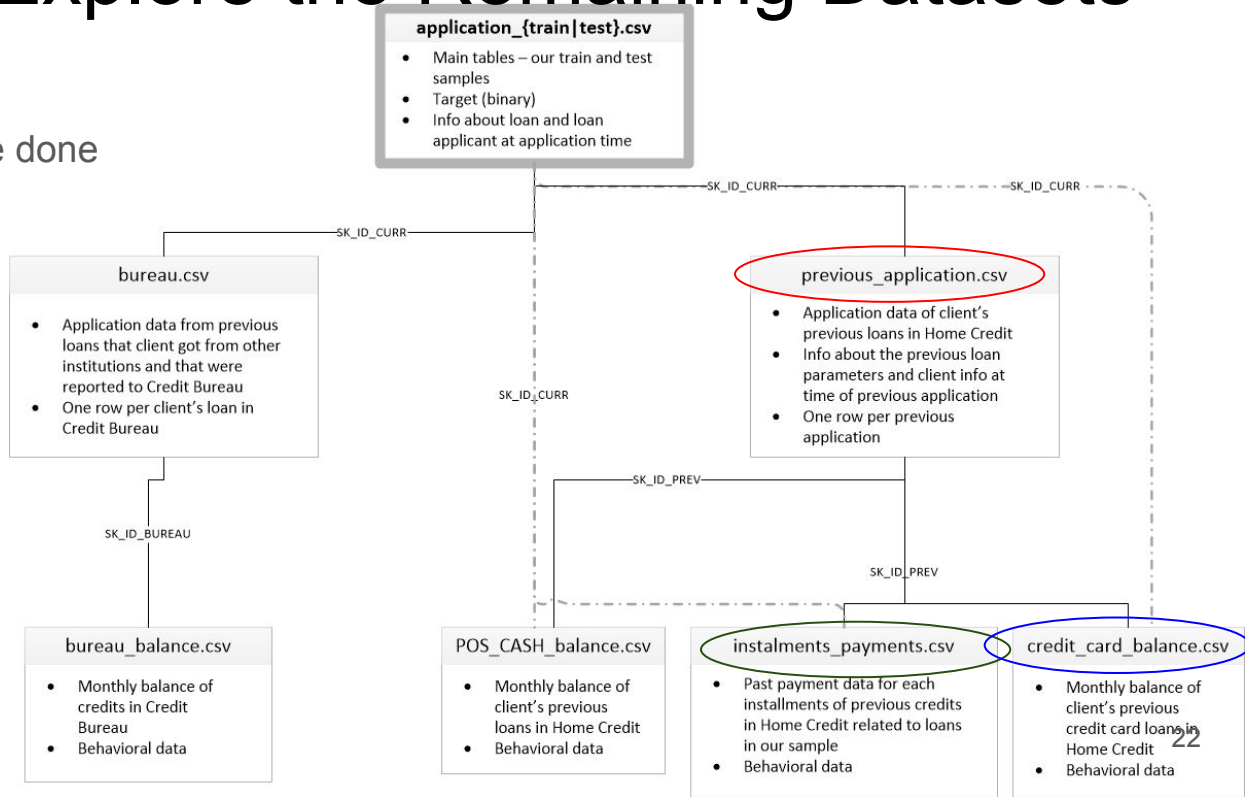
Limitations

- Difficult to predict new customers with no credit bureau records.
- Only managed to utilize 4 out of 7 datasets provided
  - Might be missing out on other important features.

Next Step: Explore the Remaining Datasets

- More features to select
- More Feature Engineering to be done

Application_train	307,511	122
Application_test	48,744	121
Bureau	1,716,428	17
Bureau_balance	27,299,925	3
Previous_application	1,670,214	37
POS_CASH_balance	10,001,358	8
Credit_card_balance	3,840,312	23
Installments_payments	13,605,401	8




Thank
You


Questions
Answers

How to improve your credit score risk grade in Singapore

- Always repay loans on time
- Avoid making multiple loan enquiries in a short time
- Don’t have too many credit facilities open
- Never default on your loans