



# CAPSTONE PROJECT: PREDICTING PROBLEM MORTGAGE LOANS

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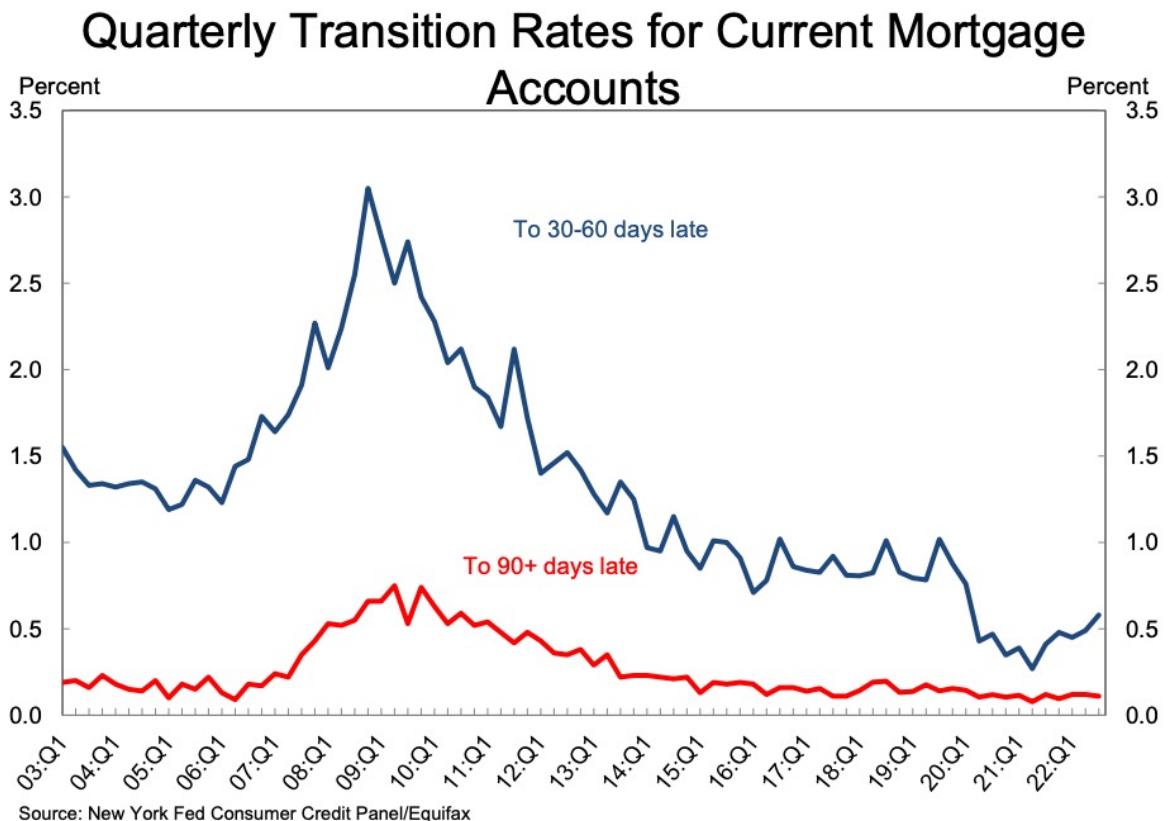
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# PROBLEM STATEMENT

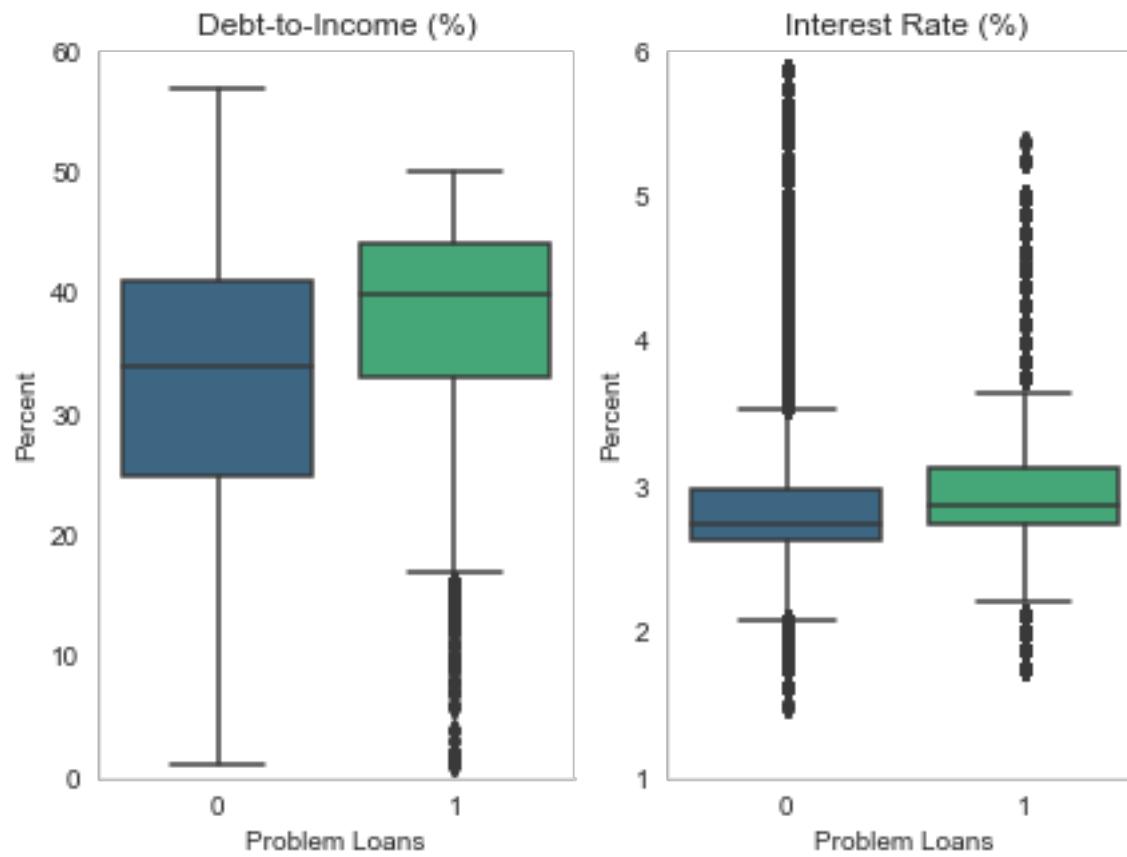
Fannie Mae wants to better predict the likelihood that a borrower will have problems paying its mortgage loan and to identify the features that best identify problem loans.



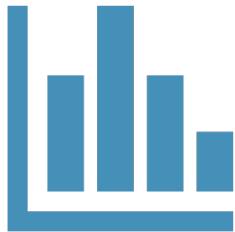
*While mortgage loan delinquencies are currently very low, there are indications of potential increasing stress.*

# GOAL

The goal is to predict the probability of problem loans and to identify their features in order to manage credit risk.



# DATA UNDERSTANDING



## Data

- Fannie Mae Single Family Loan Data
- Loans acquired in Q1 2021
- Over 23 million records



## Methods

- Descriptive data analysis and statistics
- Machine learning modelling

# DATA UNDERSTANDING

## Definitions

### Problem loans

payments that are 90 or more days past due

have been modified, restructured, or received any borrower assistance

have been foreclosed

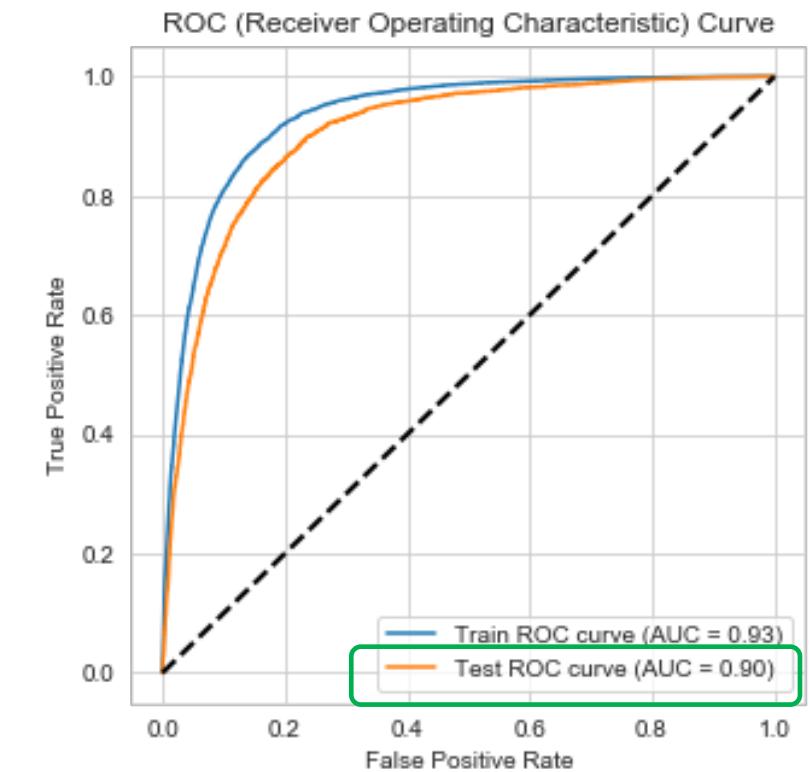
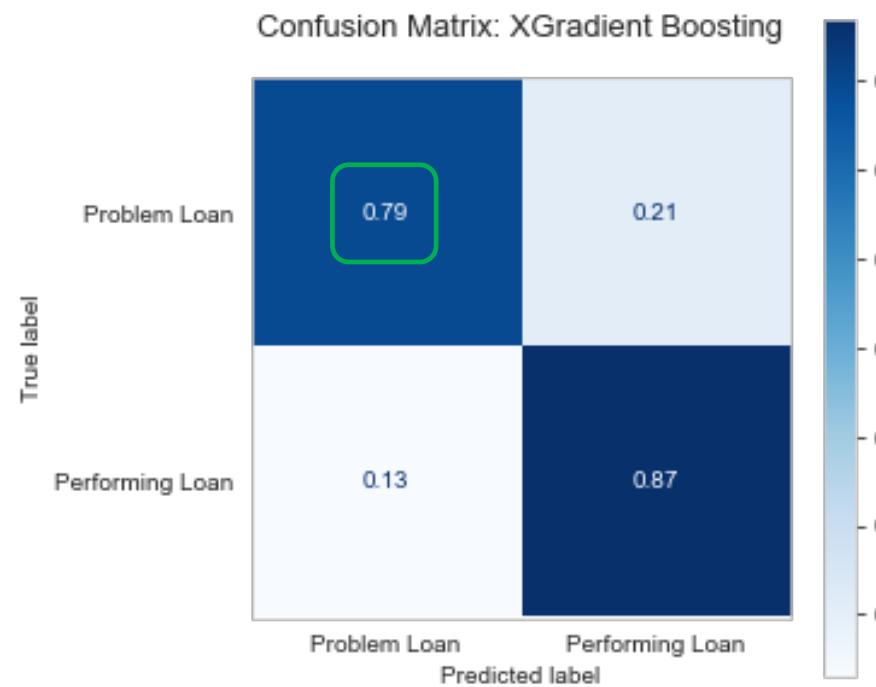
### Binary classification

problem loans are classified as '1'

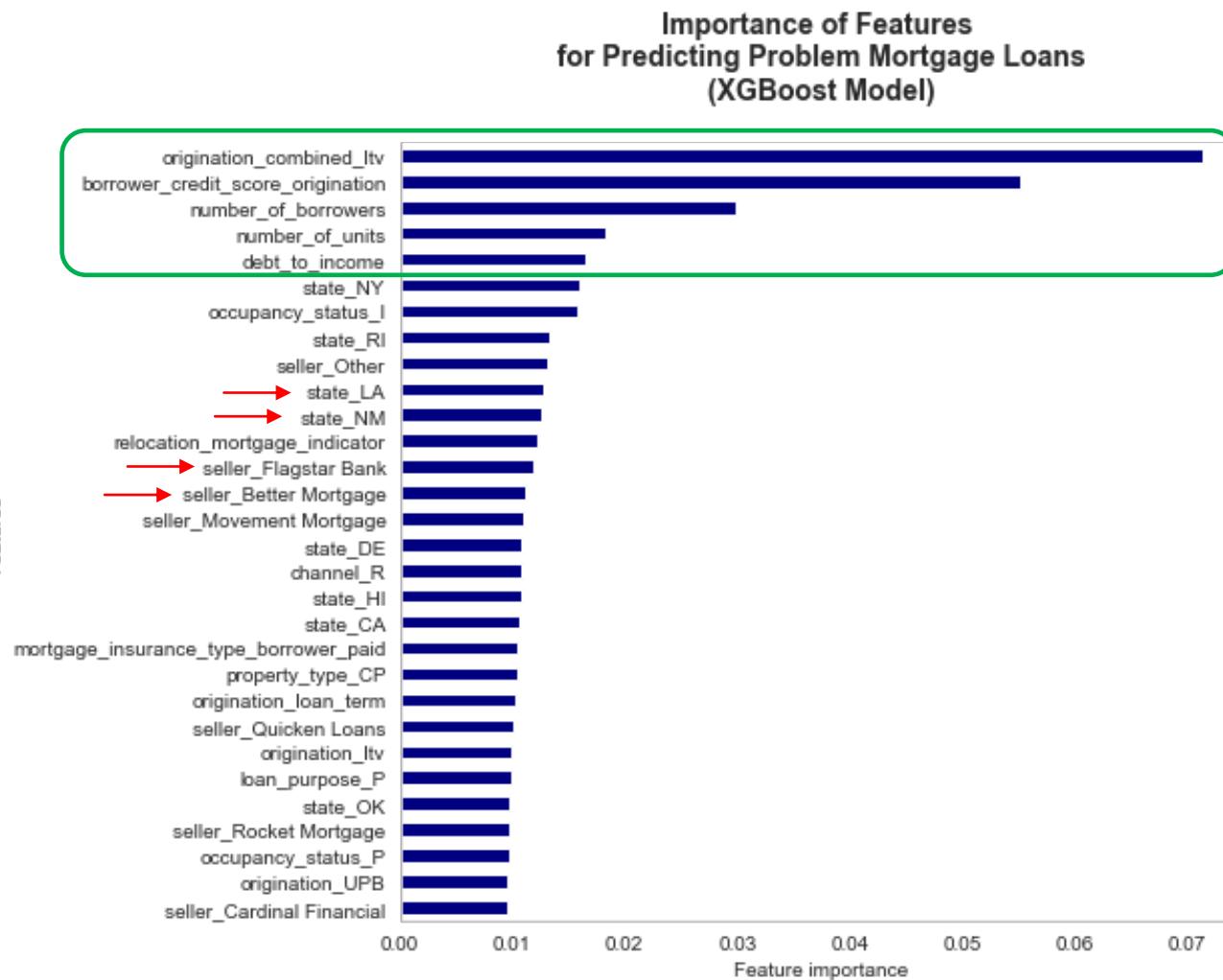
non-problem, performing loans are classified as '0'

# RESULTS

- XGBoost model selected as best performing model
- f1 score of 84%, indicative of the model's combined precision and recall ability
- ROC\_AUC score of 90.5% for the test set.
- True positive rate of 79%



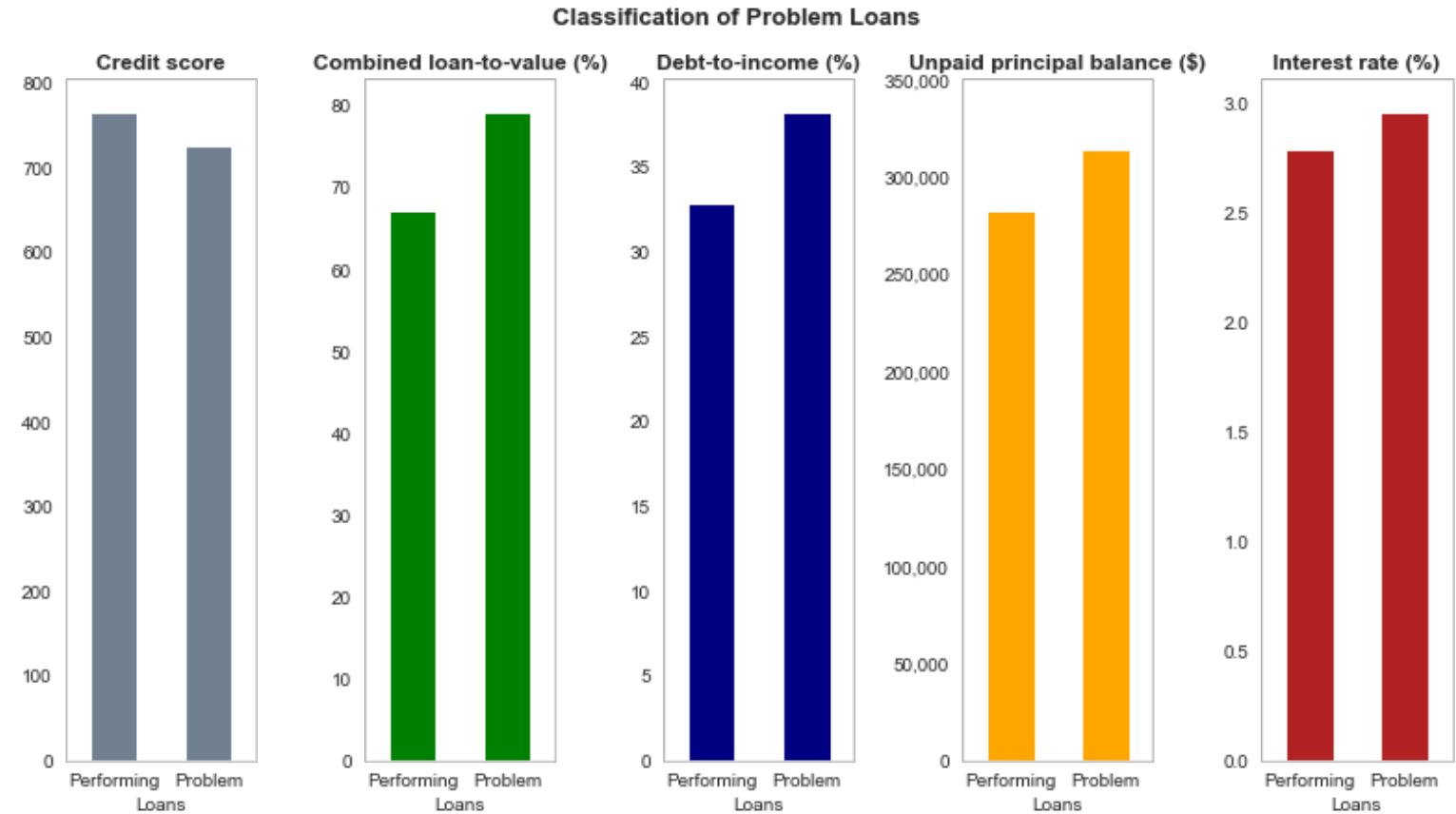
# RESULTS



- Top five features are not surprising, as these metrics are commonly used in credit risk assessments
- Interestingly, the model also identifies several states and sellers of loans that are important in determining the classification of a loan as problematic

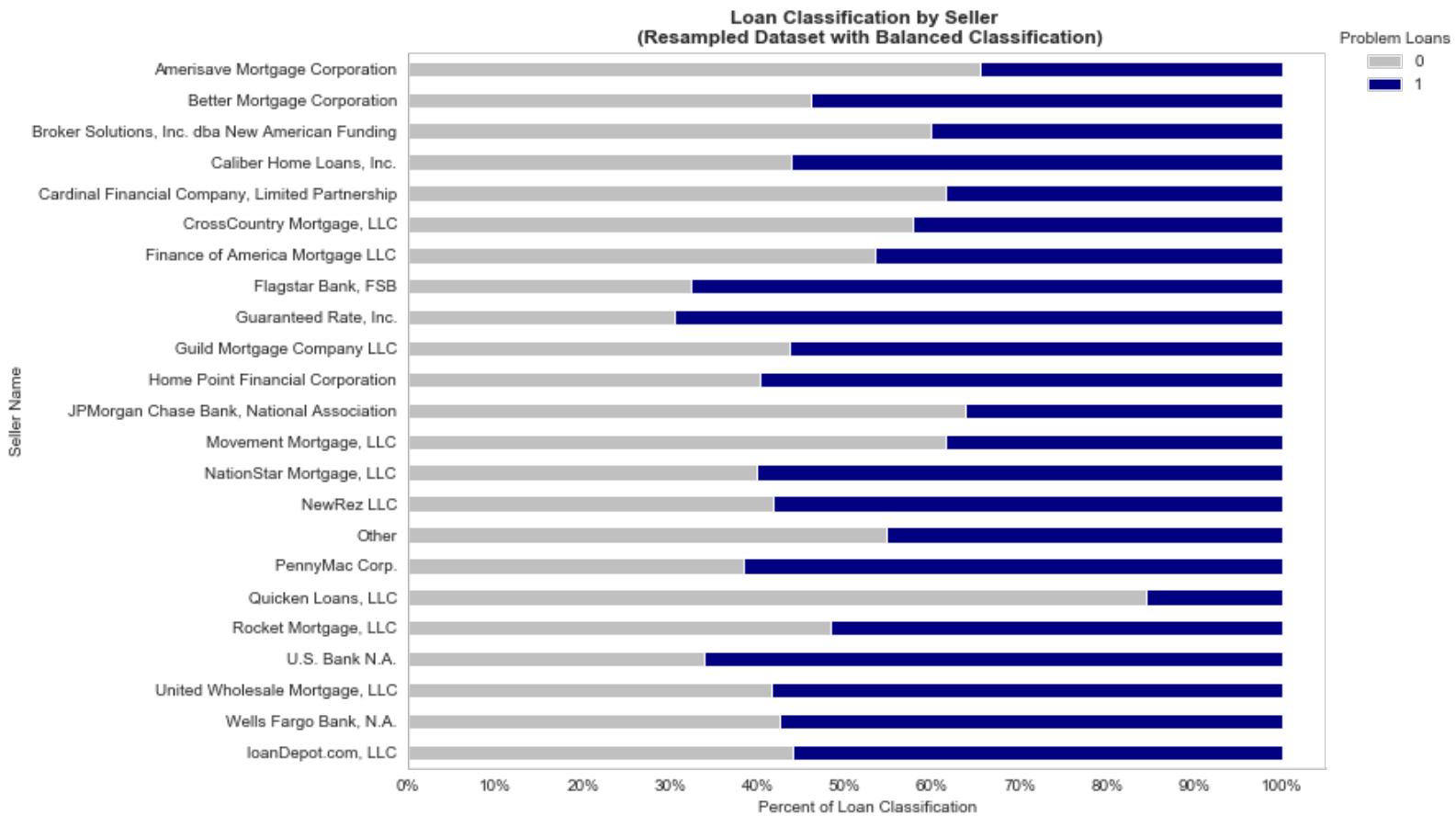
# RECOMMENDATIONS

- Adjust the criteria Fannie Mae applies to the loans they acquire and guarantee
- Focus credit risk management resources on loans that are likely to be problem loans



# RECOMMENDATIONS

- Mortgage loans sold by Flagstar Bank, Better Mortgage, and Rocket Mortgage should be examined more closely for problem loans compared to other sellers



## NEXT STEPS: EXTENDED ANALYSIS



Improve model performance



Extend geographical analysis  
to zipcode level



Predict value of losses for  
problem loans

# THANK YOU

***For questions, contact:***

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