

# Loan Analysis and Classification

Daniel Nichol 1000ml

# This Presentation Will Be Successful If..

You come out with a good understanding of the current allocation of loan types in the system and the characteristics of the customers that purchase big and small loans.

# Outline

1. Types of Loans
2. Pre-Approving Loans
3. Separating By Loan Size
  - a. Small
  - b. Large
4. Summary and Recommendations

# Types of Loans

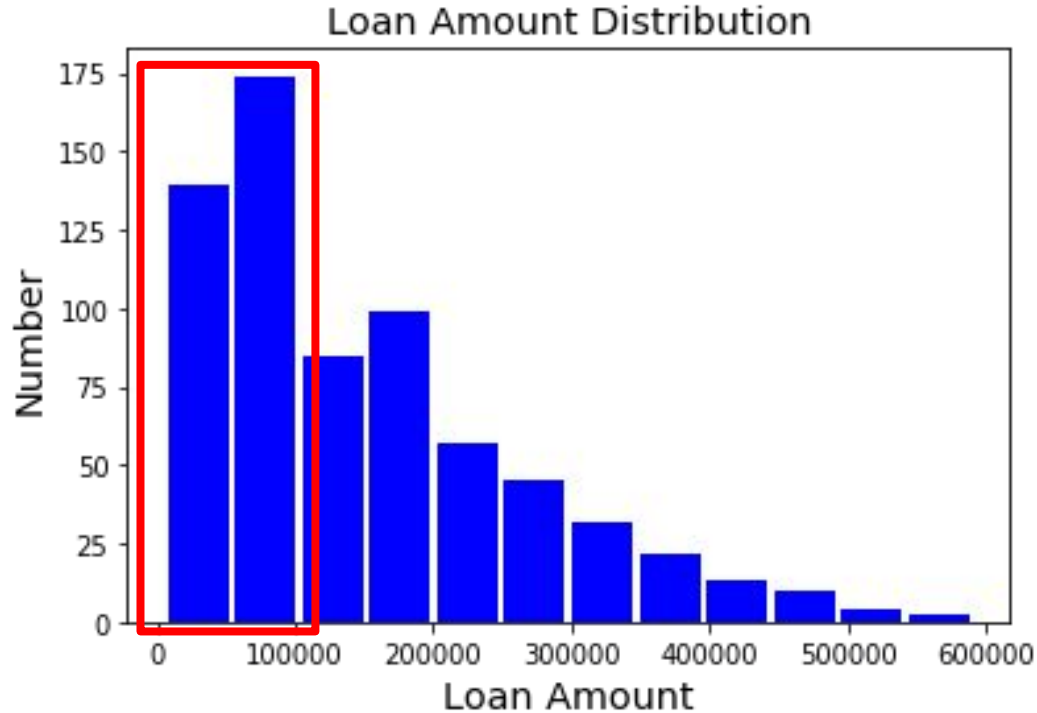
A: Finished

C: Running

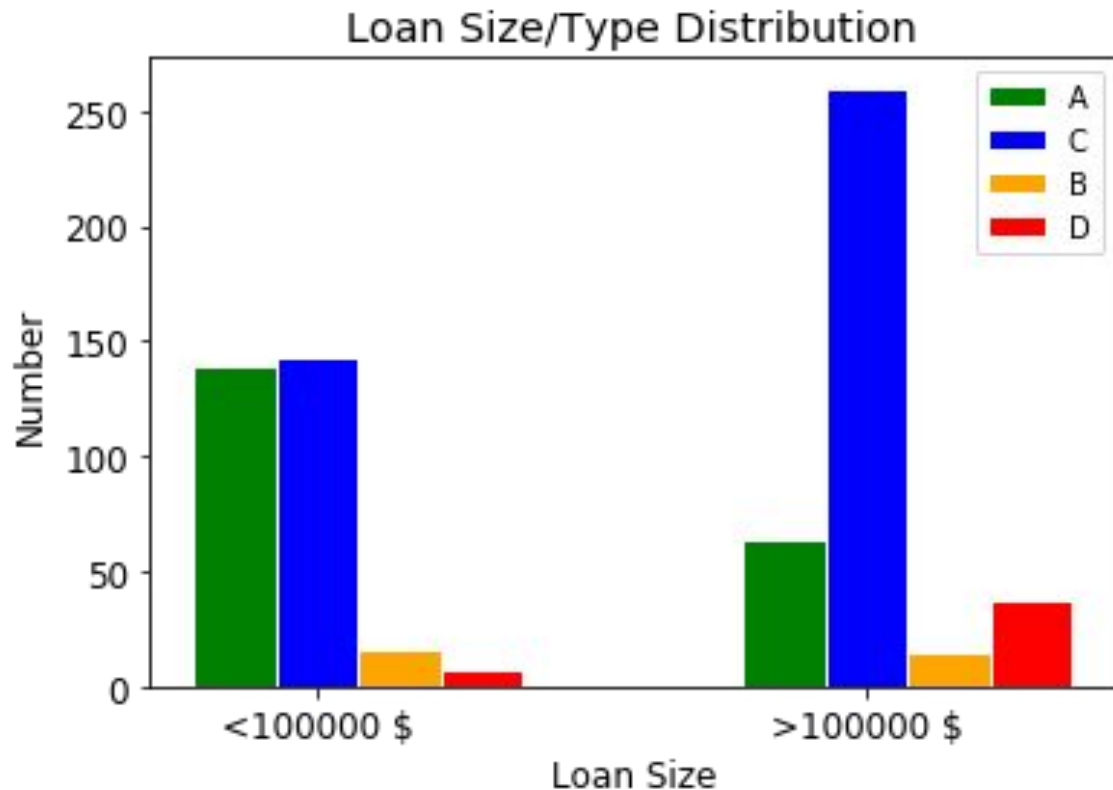
B: Finished, Not Paid

D: Running, In Debt

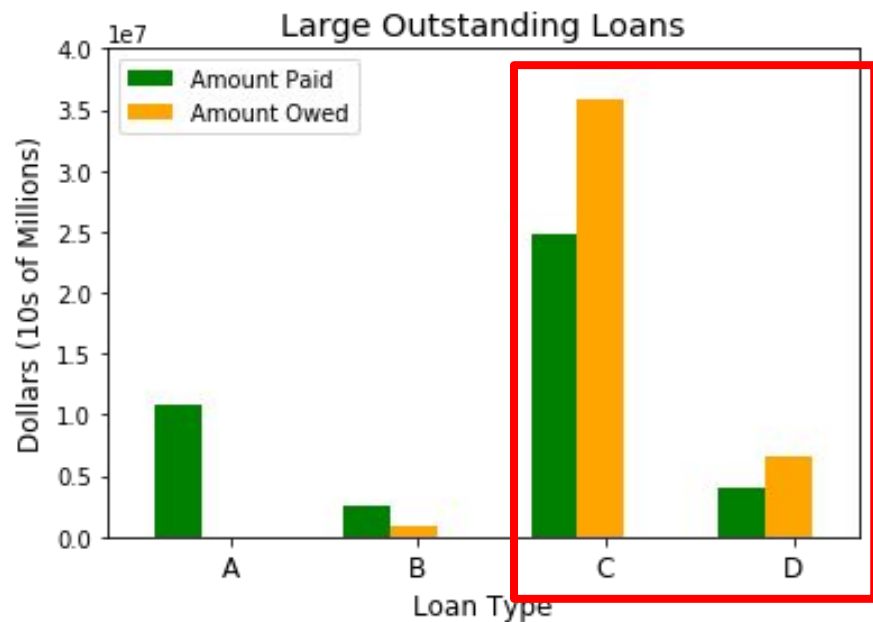
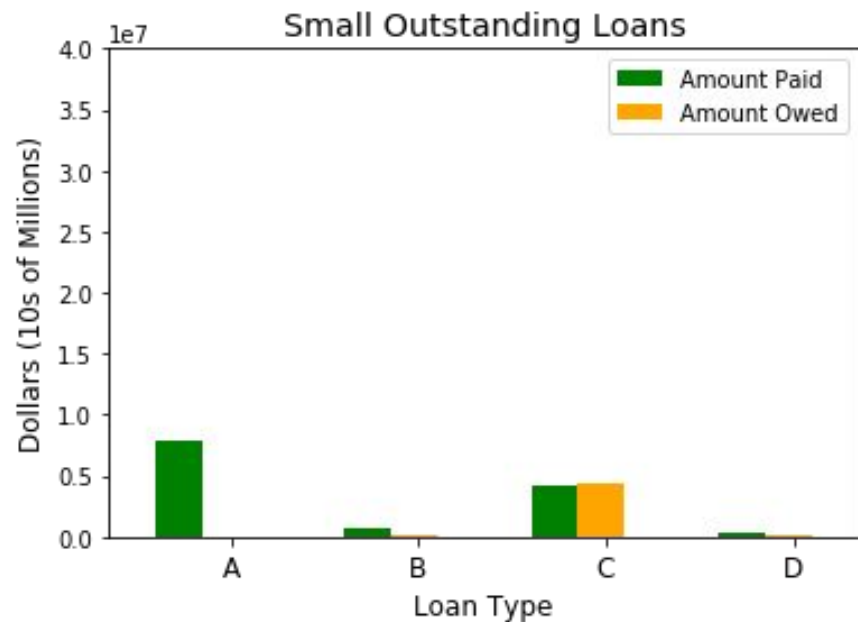
# Most Loans Are Small Loans



# Most Large Loans Are Not Yet Completed



# Large Loans Carry The Most Risk





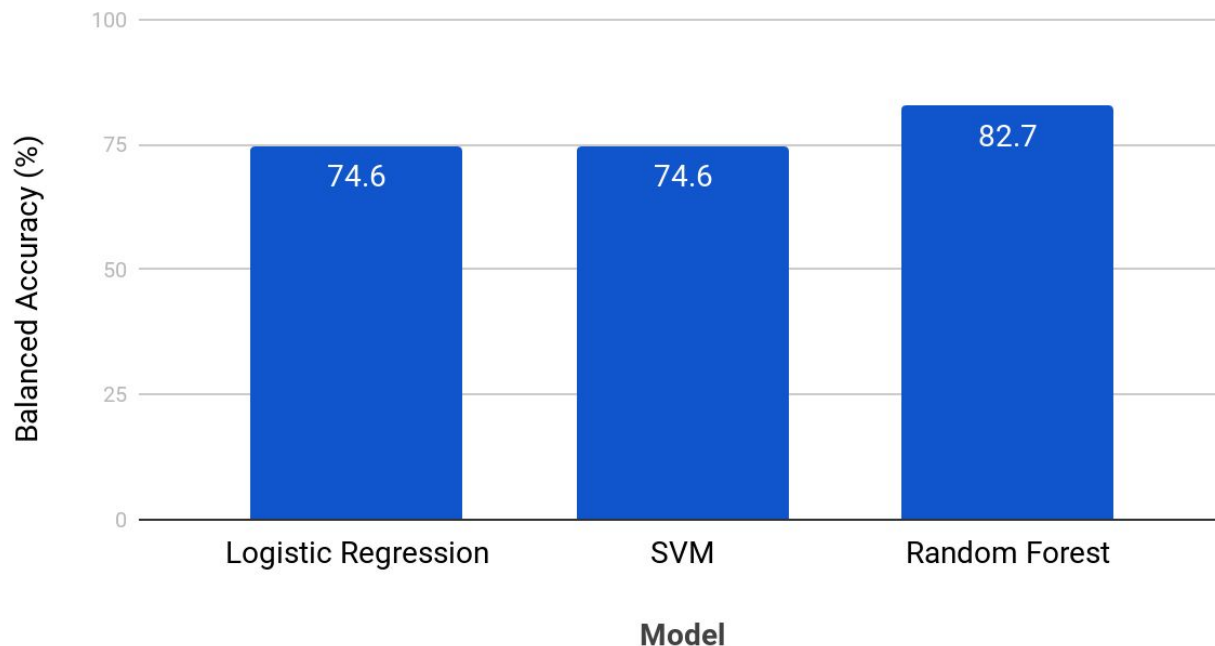
# Pre-Approving Loans

# Methodology

1. Matched Loan information with all other relevant information in the database on a client level.
2. Only transactions from before the loans were activated were included.
3. Included all loans of all types, combining
  - a. A/C as good loans
  - b. B/D as bad loans
4. Ran 3 types of classification models on the 682 loans available
  - a. Logistic Regression
  - b. Support Vector Machine
  - c. Random Forest

# Random Forest Model Performs Best

Classification Model Comparison



# Having Money Predicts Good Loans!

1. Having any type of Credit Card
2. High Mean and Minimum Balances
3. Low Balance Variance
4. High House Payments
5. High Density of Entrepreneurs in the area

**93% of remaining customers (3538 people) qualify for a loan!**

# 280 People Are Not Pre-Approved For A Loan

- 280 out of 3818 remaining customers (7%) should not be approved for loans
- Be wary of people with:
  - Low balances that vary a lot
  - Large amounts of interest paid on negative balances
  - No Credit Cards
  - Low Remittances to other banks
  - Low Density of Entrepreneurs in the area

What About Loan Size?

Small Loans Under \$100000

# Most People Can Be Offered Small Loans

4162 People : Are Pre-Approved For Small Loans

33 People : Are Not Pre-Approved For Any Loans

Model: 92% Accuracy Rating



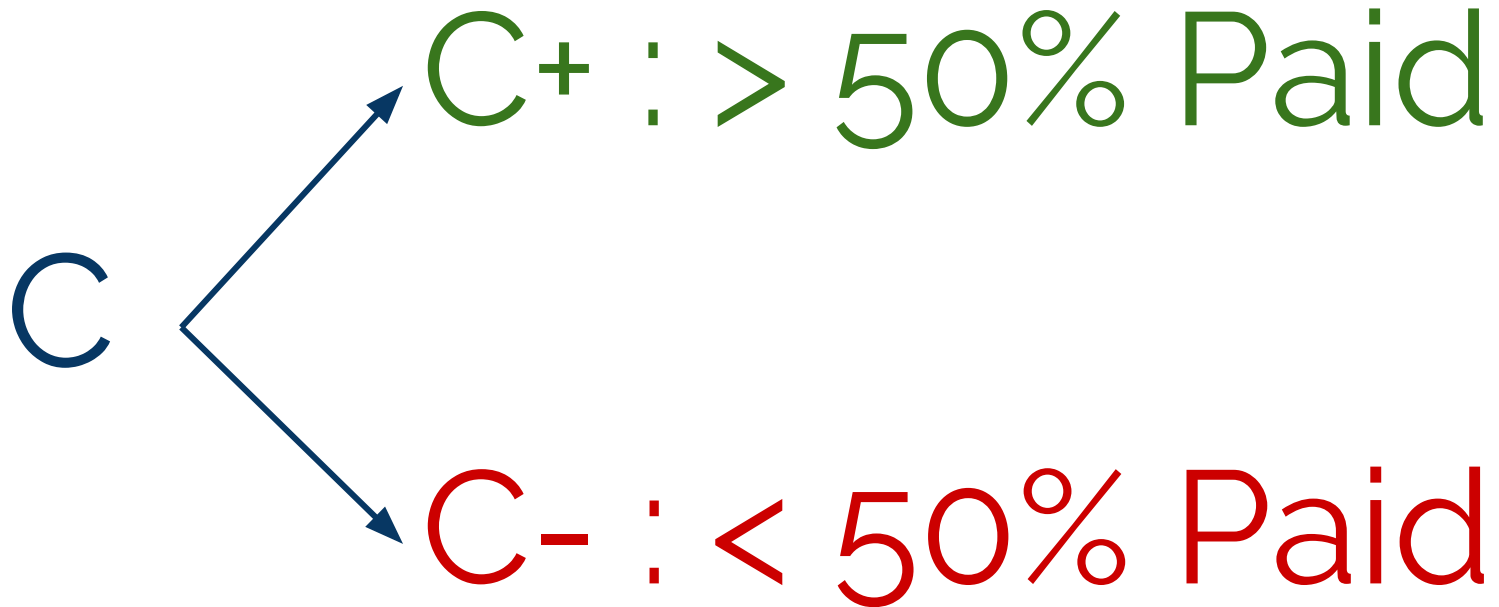
# People To Avoid Giving Any Loans To

Be most wary of people with:

- Low payments for statements
- From areas with low population density
- Low remittances to other banks
- No credit card
- High variance in balance

Big Loans Over \$100000

# C Was Split To Reduce Risk



# Only 279 People Can Be Offered Large Loans

279 People : Are Pre-Approved For Big Loans

3844 People : Are Not Pre-Approved For Big Loans

Model: 72% Recall Score

# Very Affluent People Can Get Big Loans

People that are most trustworthy:

- Areas of low unemployment and high salary
- High minimum and maximum balance
- From areas with low population density
- Low amounts of interest credited

# Summary

- Most Loans are small, but most money outstanding is in large loans.
  - Most risk for default is in large loans
- Most people qualify for small loans under \$100,000
- With more stringent threshold most people don't qualify for big loans over \$100,000

# Recommendations

- Scale down large loan approval until risk is more manageable
- When giving small loans be wary of people with:
  - No Credit Card, from rural areas,
  - Low balances and highly variable balance amount.
- When giving large loans promote to people:
  - From areas of low unemployment, high salaries and low density
  - With high minimum balances, and high maximum balances

# Future Work

- Further separate on loan size with more data
  - Find optimal loan size for each customer
- Create own segmentation of loan success for better interpretation and classification
- See how loan allocations have changed over time

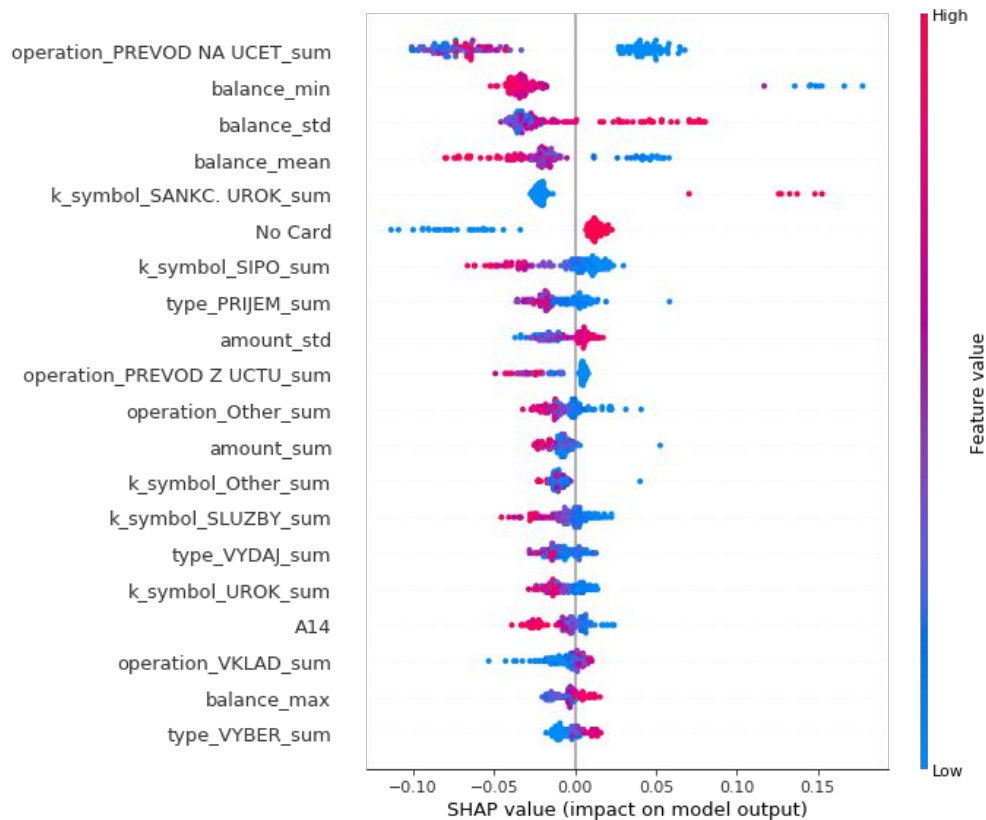


Thank You



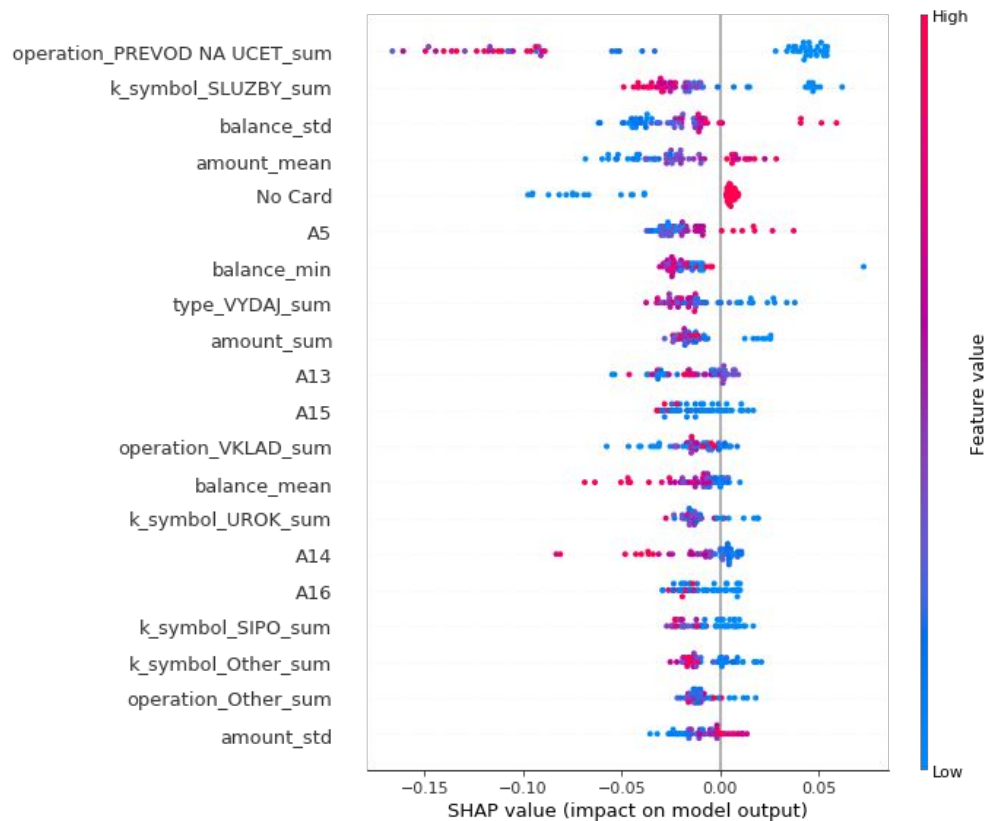
# Appendix

## All Loan Shapley Values



# Appendix

## Small Loan Shapley Values



# Appendix

## Big Loan Shapley Values

