Predict Default Loans with Lending Club Data

Hugo Yu

08-12-2020

Introduction

Build a tool to help the lending club investors to make better-informed decision on note choice

2007 to 2018 Lending Club historical data

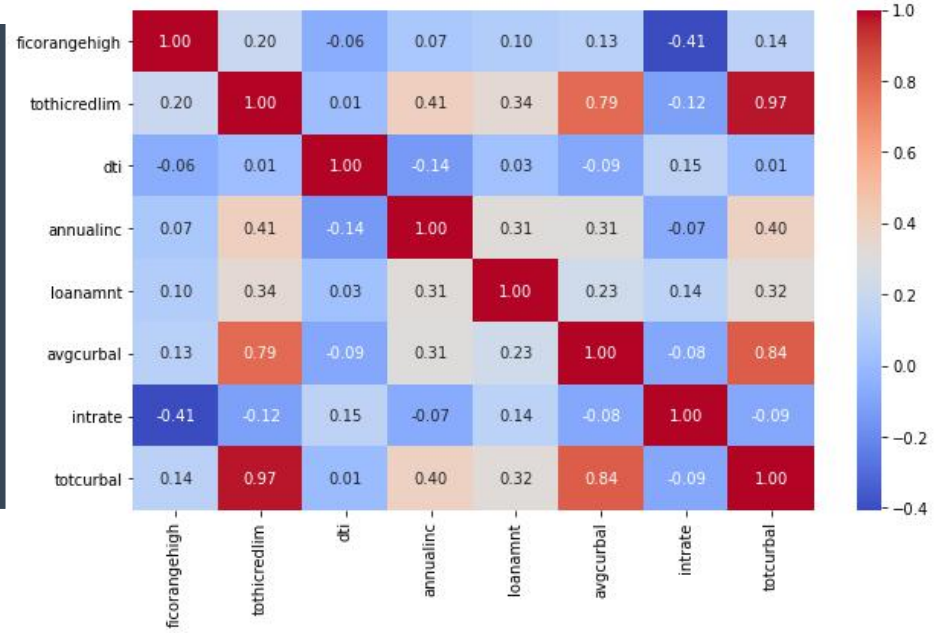
Logistic regression, random forest, and gradient boosting tree

The model was able to predict the default loan with AOC score around 0.72 and the top important features were identified

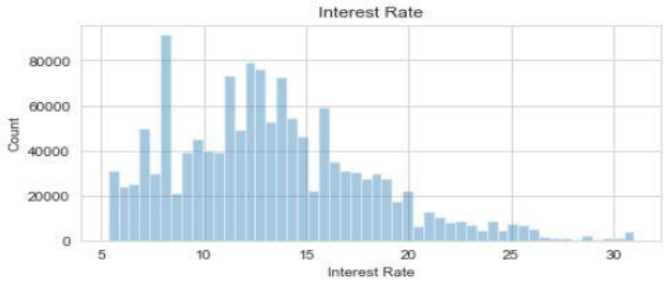
EDA and Data Preprocessing

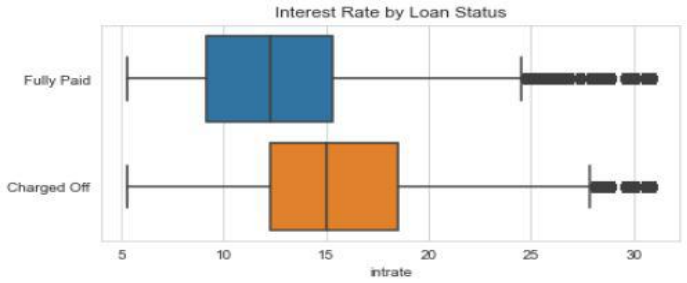
- Data description
  - historical 2007-2018
  - 2260701 loans
  - 150 associated features
  - latest note data by api
- Feature Selection
  - field match
  - missing data
  - highly correlated features
  - zipcode and text features
- Feature Engineering
  - label encoding
  - one-hot-encoding

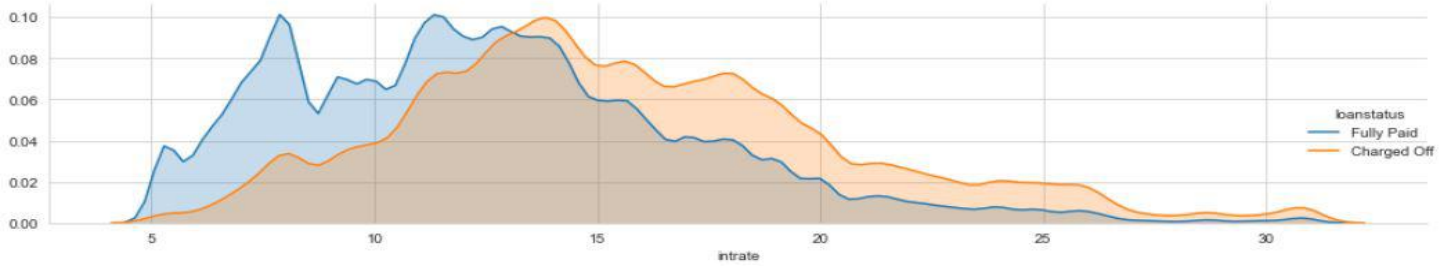
Correlation heatmap



Interest Rate







Model Training and Evaluation

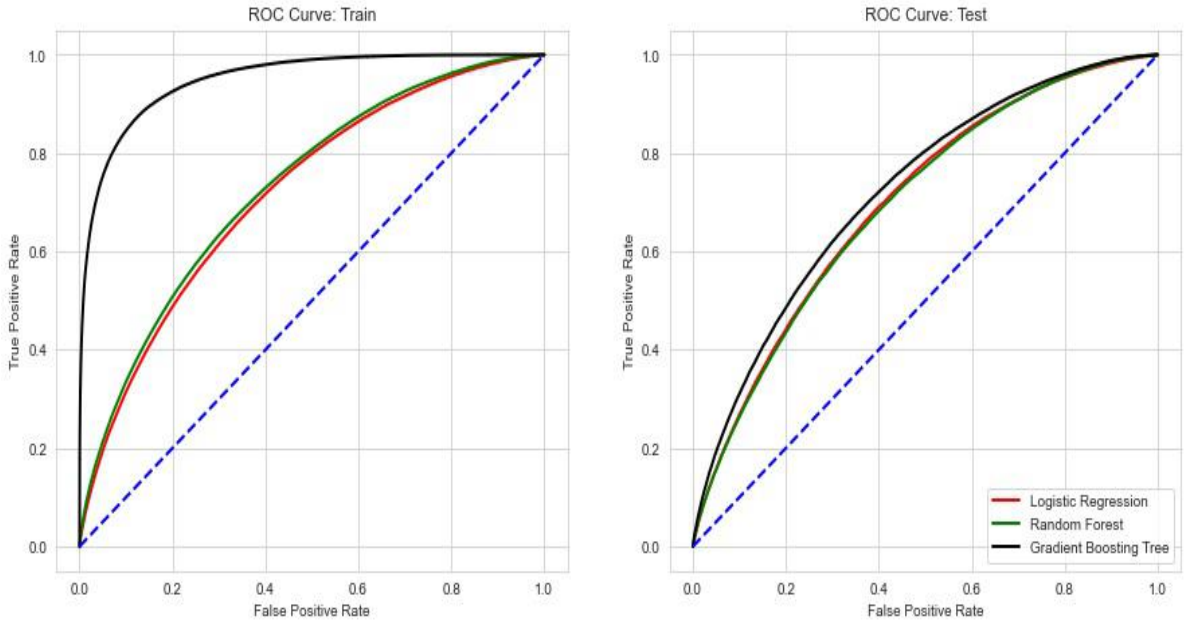
- Train/Test data split
  - train: test at 8:2

- Model Selection
  - Logistic regression
    - Recursive Feature Elimination
  - Random forest
  - Gradient boost tree
    - feature importance

Top factors

	importance
credithistory	0.101854
mosinoldrevtlop	0.073039
mosinoldilacct	0.051138
dti	0.045329
annualinc	0.042021
loanamnt	0.038239
avgcurbal	0.031184
intrate	0.029794
revolbal	0.027767
revolutil	0.026138

Model Performance



In training dataset, GBT has the significantly higher AUC score than the other two. However, the GBT score is only slightly higher in test, indicating that the model is likely overfitting.

Summary and Future Work

- The current model was able to predict the default loan at an AUC score around 0.72
- The top 5 factors:
  - credit score
  - months since the oldest revolving account
  - months since the oldest installment account
  - borrower's installment to debt ratio
  - and borrower's annual income

- Relate the zipcode feature to more meaningful information
- NLP analysis for text feature
- Fine tune the model
- Use FLASK to create an online tool