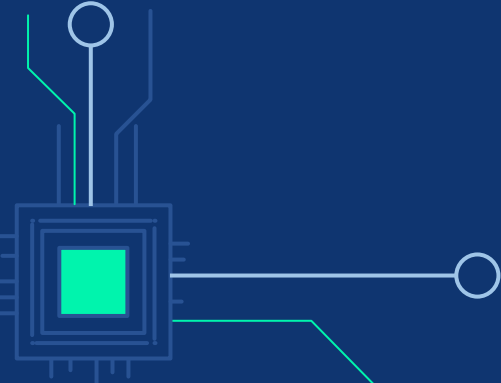
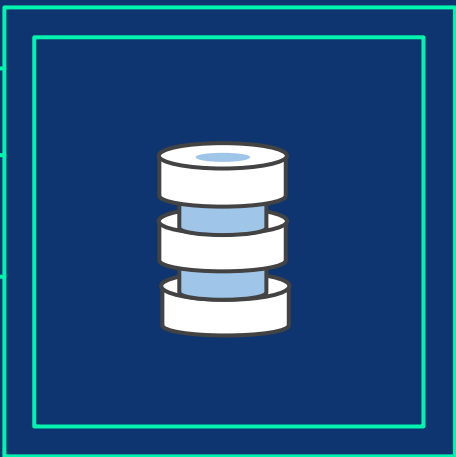




LOAN DEFAULT CLASSIFICATION

Manveer Sadhal
Oct 29, 2021





NEED

Identify loans in Interested Lending, Inc.'s current loan portfolio that are likely to default.

Use cases:

- Contact borrower
- Incorporate expected defaults into operating plan
- Identify loans to sell to another institution

DATA AND SCOPE

DATA

- Snapshot of 887,000+ individual loans.
- Filtered to approximately 250,000 loans.
- 73 columns reduced to 19 features for final model (e.g. annual income, interest rate)

SCOPE

- Current and closed loans
- Model developed with closed loans (fully paid, charged off, or defaulted).

METHODOLOGY

PANDAS
NUMPY
MATPLOTLIB
SEABORN

SCIKIT-LEARN

DATA
EXPLORATION &
FEATURE
SELECTION

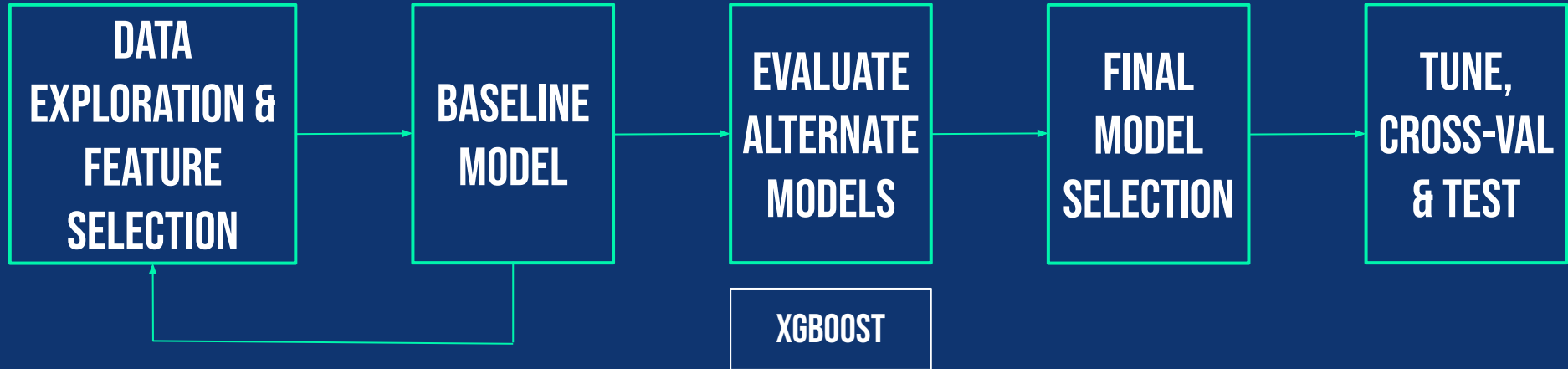
BASELINE
MODEL

EVALUATE
ALTERNATE
MODELS

FINAL
MODEL
SELECTION

TUNE,
CROSS-VAL
& TEST

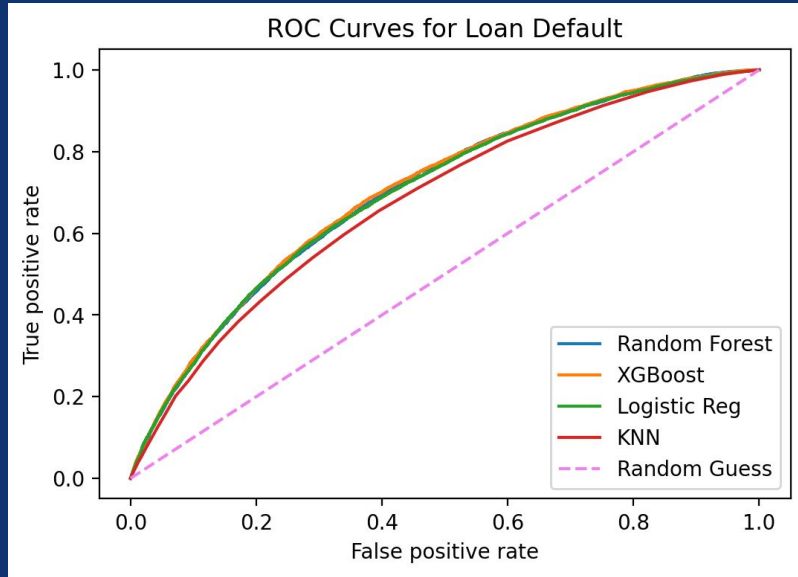
XGBOOST



RESULTS

Better

Better



- Logistic regression model, random forest, and XGB had nearly identical performance.
- Logistic regression selected - simpler, more interpretable.

RESULTS (LOGISTIC REGRESSION)

	Precision	Recall	F1
Paid	0.89	0.63	0.74
Default or Charge Off	0.29	0.66	0.40
Accuracy	0.63		
Macro Average	0.59	0.64	0.57
Weighted Average	0.78	0.63	0.68

Tuned to maximize F2
Final score: 0.52

RESULTS

Greater impact ↑

Feature	Coefficient
Interest Rate	0.469
Annual Income	-0.284
Total Number of Accounts	-0.187
Term of 60 months (vs. 36)	0.176
Debt to Income Ratio	0.174

INTERACTIVE STREAMLIT APP

Loan Default Classification

Enter information below. Default prediction will be displayed at the bottom of the screen.

Annual income (USD)

0

Number of accounts in collections within past 12 months (excluding medical)

5

Number of delinquencies over 30 days in the last two years

29

Debt to income ratio

29

Credit inquiries in the last 6 months

5

Interest rate (%)

29.00

Number of open credit lines in borrower's file

46

Number of derogatory public records

5

Revolving debt utilization (%)

62

Total number of credit lines in borrower's file (open or closed)

16

Total number of accounts currently delinquent

5

Loan Term (months)

60

Loan Grade

G

Installment (USD)

1215


Loan is expected to default!

CONCLUSIONS

- Model offers predictive capability for approved loans that may go into default
- Most impactful features can inform loan screening process
- Possible actions for loans likely to default:
 - Borrower outreach
 - Identify loans to sell to other institutions
 - Account for expected loan defaults in operating plan



FUTURE WORK

- Additional feature engineering
 - Model stacking
 - Develop separate model to evaluate whether high risk loans should be sold
 - Add functionality to app to allow user to upload CSV with data on multiple loans rather than inputting one at a time
- 

THANKS!



Do you have any
questions?

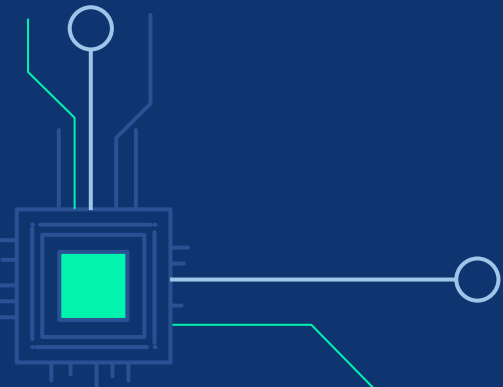
addyouremail@freepik.
com +91 620 421 838
yourcompany.com

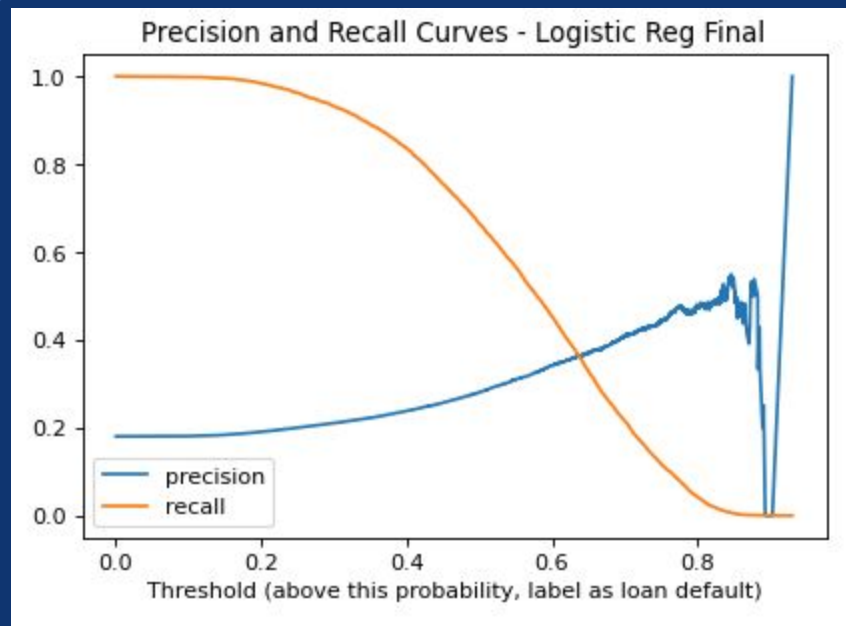
CREDITS: This presentation template was created by
Slidesgo, including icons by **Flaticon**, and infographics &
images by **Freepik**

Please keep this slide for attribution



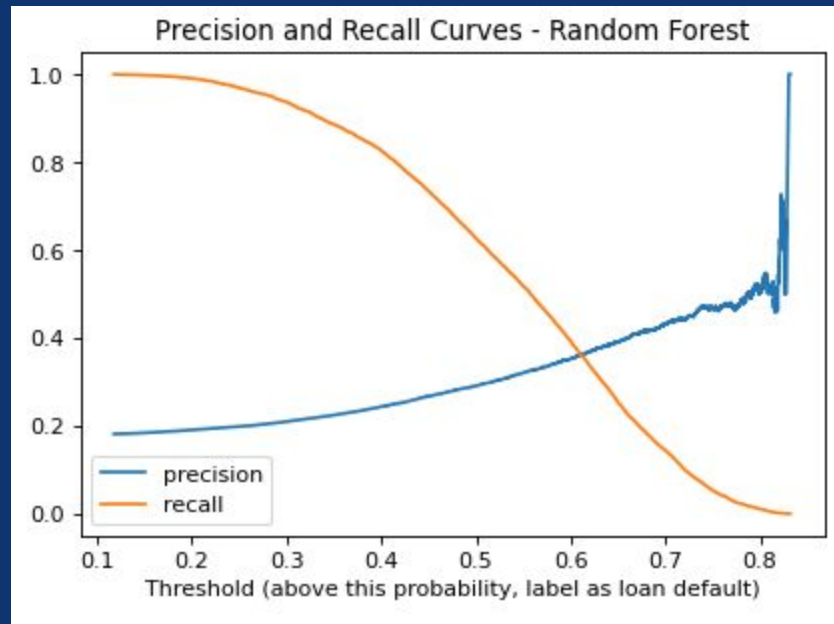
APPENDIX





```
'mean_test_score': array([0.52294971, 0.52292928, 0.52295788, 0.52292928, 0.52295248,
0.52292928, 0.52293755, 0.52295   , 0.52294028, 0.52295   ,
0.52294584, 0.52295   , 0.52301339, 0.52297616, 0.52300787,
0.52297616, 0.52300787, 0.52297616, 0.52296372, 0.52298436,
0.52296366, 0.52298436, 0.52298441, 0.52298436, 0.52296096,
0.52298436, 0.52296366, 0.52298436, 0.5229817  , 0.52298436,
0.52295276, 0.5229843  , 0.5229843  , 0.5229843  , 0.52297898,
0.5229843  , 0.52298431, 0.5229843  , 0.52298154, 0.5229843  ,
0.52297622, 0.5229843  , 0.52298154, 0.5229843  , 0.52298165,
0.5229843  , 0.52297892, 0.5229843  , 0.52297898, 0.5229843  ,
0.52297889, 0.5229843  , 0.52298707, 0.5229843  , 0.5229843  ,
0.5229843  , 0.5229789  , 0.5229843  , 0.52298157, 0.5229843  ,
0.52297616, 0.5229843  , 0.52297889, 0.5229843  , 0.5229555  ,
0.5229843  , 0.52298433, 0.5229843  , 0.52298157, 0.5229843  ,
0.52298983, 0.5229843  , 0.52297616, 0.5229843  , 0.52298166,
0.5229843  , 0.52298431, 0.5229843  , 0.52298157, 0.5229843  ,
0.52298431, 0.5229843  , 0.52297613, 0.5229843  ]),
'std_test_score': array([0.00465179, 0.00469768, 0.00464358, 0.00469768, 0.00465376,
0.00469768, 0.00468125, 0.00471252, 0.00468019, 0.00471252,
0.00468825, 0.00471252, 0.00472156, 0.00472239, 0.00471705,
0.00472239, 0.00471705, 0.00472239, 0.00471271, 0.0047186  ,
0.00470566, 0.0047186  , 0.00472521, 0.0047186  , 0.00471049,
0.0047186  , 0.00470566, 0.0047186  , 0.00470202, 0.0047186  ,
0.00471473, 0.00471161, 0.00471161, 0.00471161, 0.00473116,
0.00471161, 0.00471159, 0.00471161, 0.00470943, 0.00471161,
0.00472898, 0.00471161, 0.00470943, 0.00471161, 0.004723  ,
0.00471161, 0.00472415, 0.00471161, 0.00473116, 0.00471161,
0.00472127, 0.00471161, 0.00471377, 0.00471161, 0.00471161,
0.00471161, 0.00472124, 0.00471161, 0.00471274, 0.00471161,
0.00472242, 0.00471161, 0.00472127, 0.00471161, 0.00471359,
0.00471161, 0.0047145  , 0.00471161, 0.00471274, 0.00471161,
0.00471552, 0.00471161, 0.00472242, 0.00471161, 0.00472342,
0.00471161, 0.00471159, 0.00471161, 0.00471274, 0.00471161,
0.00471159, 0.00471161, 0.00471909, 0.00471161]),
```





Precision and Recall Curves - XGBoost

