Company Bankruptcy Prediction

Predicting bankruptcy risk through

Machine Learning Classification

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Introduction

- Goal: Predicting bankruptcy risk and possible financial distress of public companies through financial ratios.
- Client: Bank Creditors or Investors
- Product: Machine Learning Classification model for bankruptcy risk prediction

Data & Methodology

Data & Methodology

TAIWAN STOCK EXCHANGE

- Taiwan Economic Journal
- 800-900 listed companies
- From 1999 to 2009
- rows: 6819
- features: 96

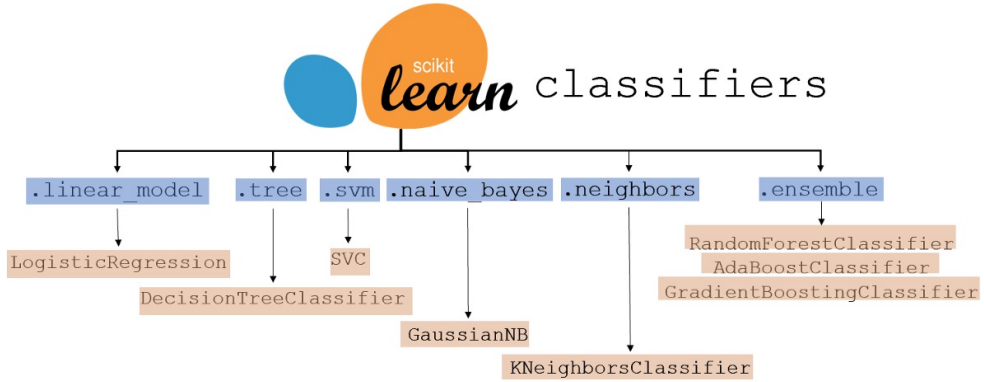
matplotlib

seaborn

pandas

NumPy

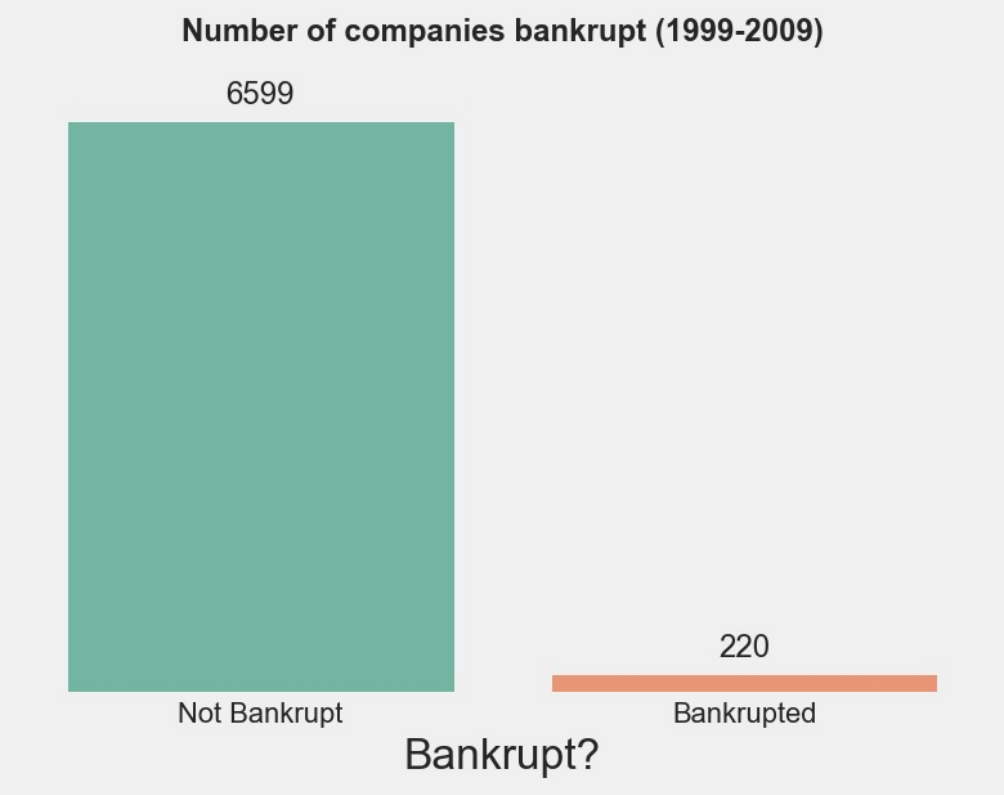
- Feature selection & Dimensionality reduction



MERGENT Online

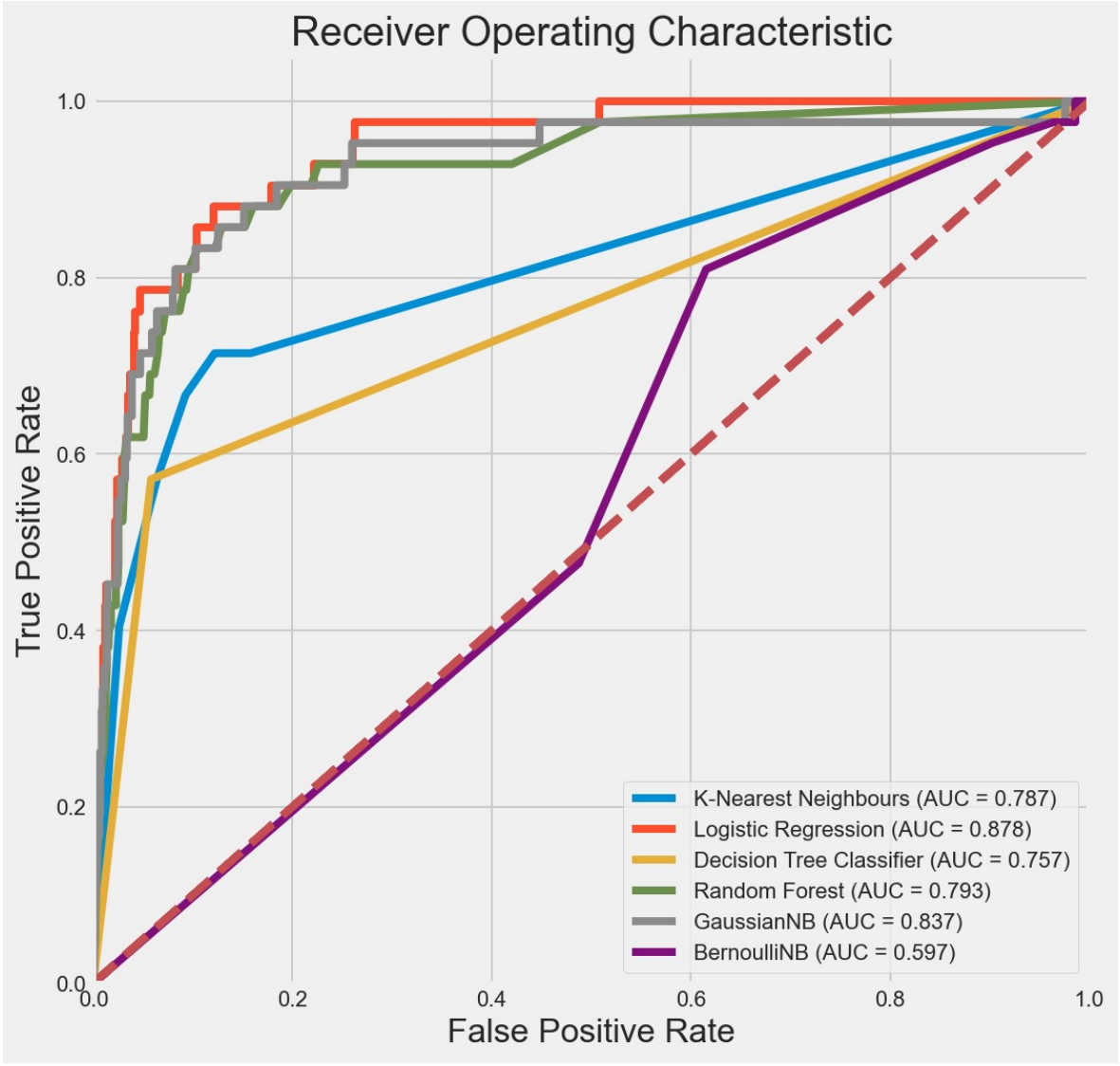
- S&P500

Exploratory Data Analysis



- True Class: Bankrupted
- False Class: No bankruptcy
- Goal: Minimize False Negative ➔ Maximize Recall

$$Recall = \frac{TP}{TP + FN}$$



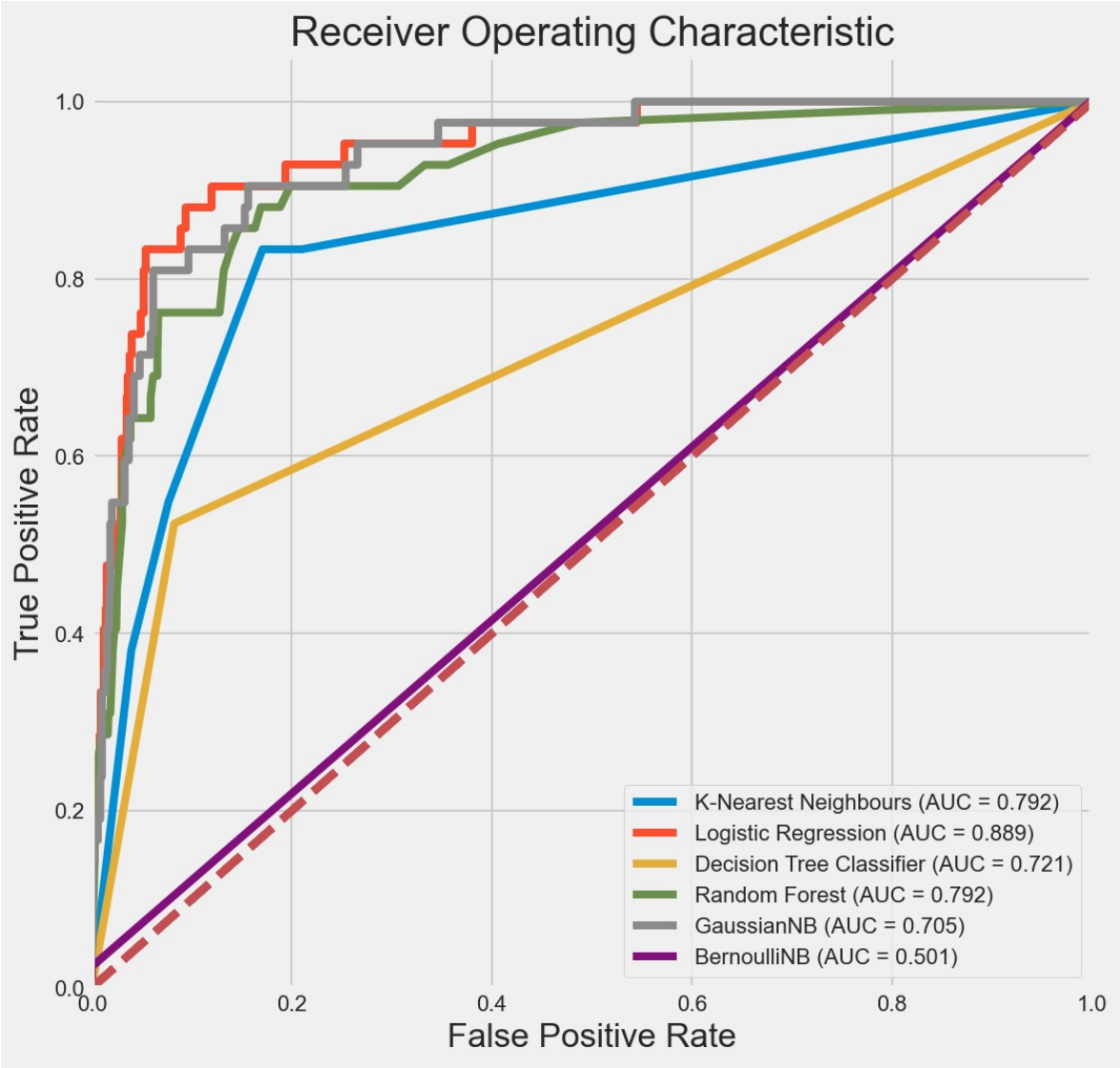
Naïve Result

Top 2 Models

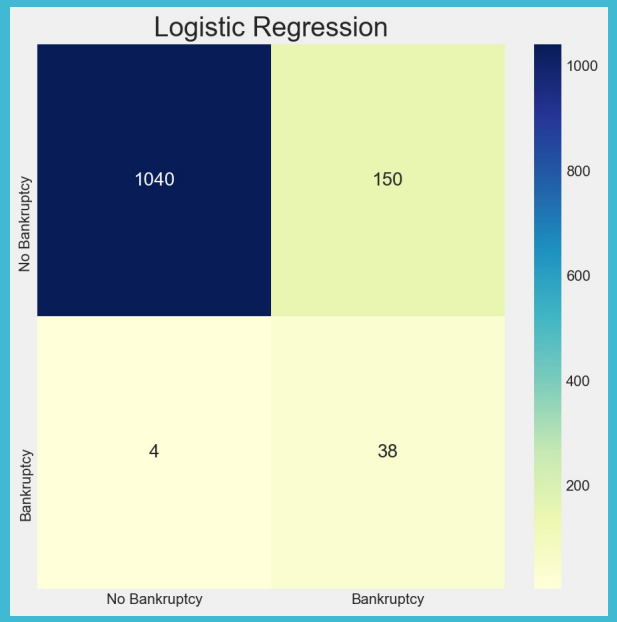
- Logistic Regression
- Gaussian Naive Bayes

Tuned Result

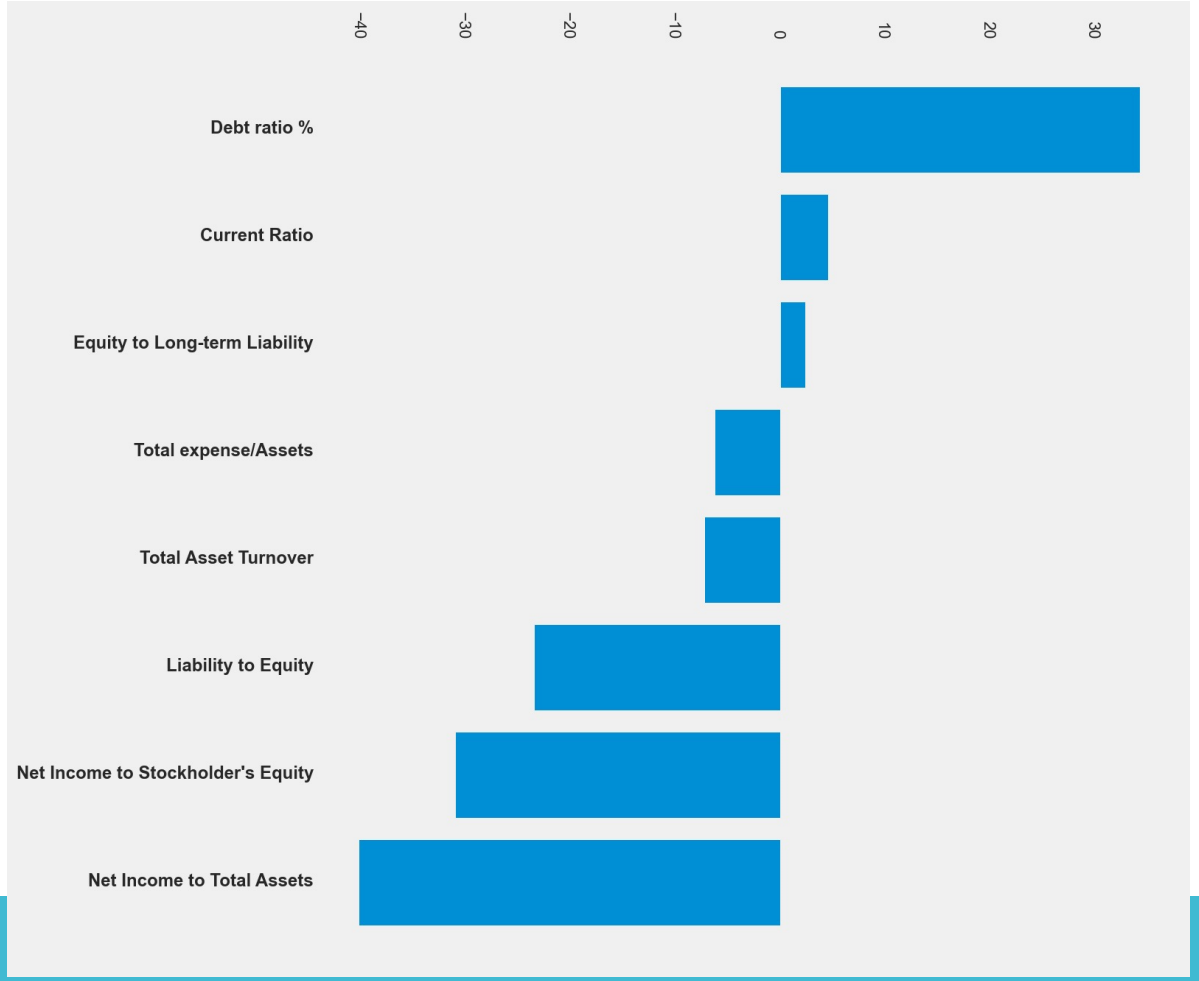
- Removing multicollinearity



Result



Model	Baseline	Tuned	
Recall	88%	90%	↑ 0.02
Precision	20%	20%	
F1	0.32	0.33	↑ 0.01
ROC_AUC	0.88	0.89	↑ 0.01



Feature	Feature Coefficient
Debt ratio %	34.34437
Current Ratio	4.62239
Equity to Long-term Liability	2.40398
Total expense/Assets	-6.22252
Total Asset Turnover	-7.189
Liability to Equity	-23.468
Net Income to Stockholder's Equity	-30.9835
Net Income to Total Assets	-40.1931

Logistic Regression

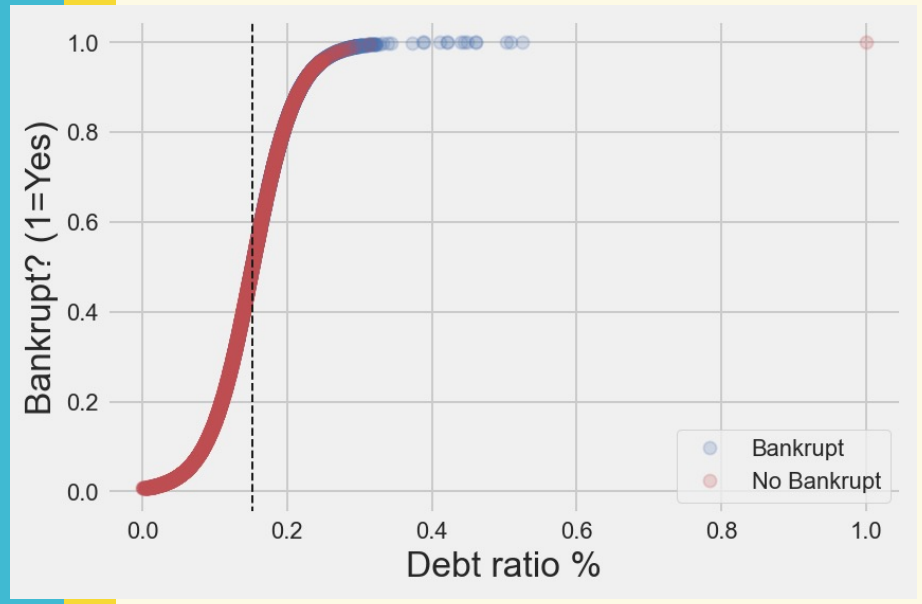
Reduced to 12 features

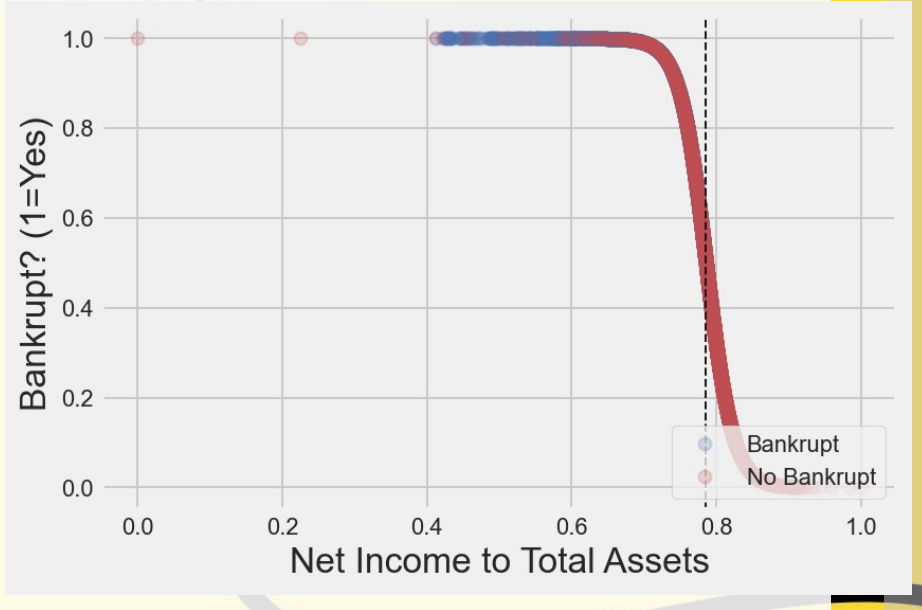
S&P500 Top identified companies

- TransDigm Group Inc
- MSCI Inc
- American Airlines Group Inc
- Kimberly-Clark Corp.
- Lamb Weston Holdings Inc

Future works

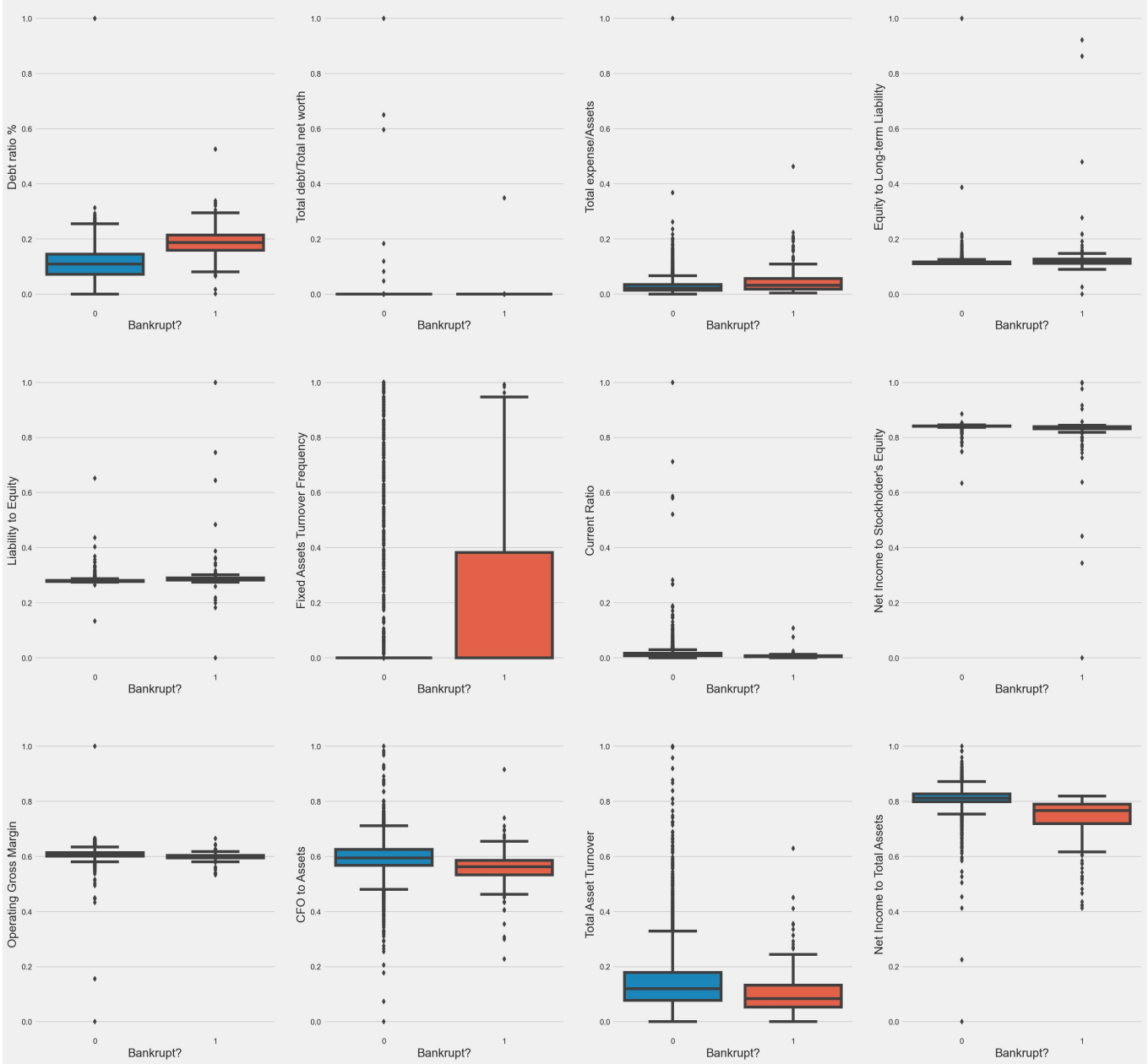
- Improving High False positive
- Improving the incorporate of SP500 data
- Try more sophisticated model techniques
  - XGBoost





Thank you

Feature Classification Performance



Pairplot of 12 features