Company Bankruptcy Prediction

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Introduction and Background

The goal of this project is to spot bankrupt companies from 95 financial book attributes.

Bankruptcy data from the Taiwan Economic Journal for the years 1999–2009

The data were collected from the Taiwan Economic Journal for the years 1999 to 2009. Company bankruptcy was defined based on the business regulations of the Taiwan Stock Exchange.

Source: Deron Liang and Chih-Fong Tsai, deronliang@gmail.com; cftsai@mgt.ncu.edu.tw, National Central University, Taiwan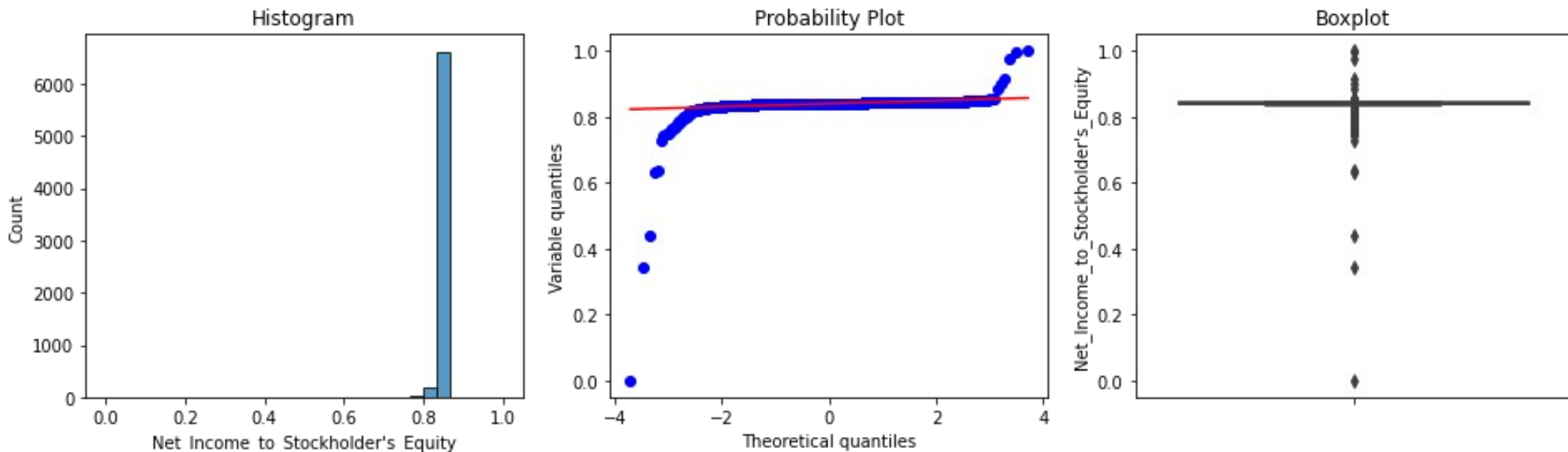 The data was obtained from UCI Machine Learning Repository: https://archive.ics.uci.edu/ml/datasets/Taiwanese+Bankruptcy+Prediction

Exploratory Data Analysis - target

The target is imbalanced with underrepresented class 1, bankrupt.

| class	0	1
count	6599	220
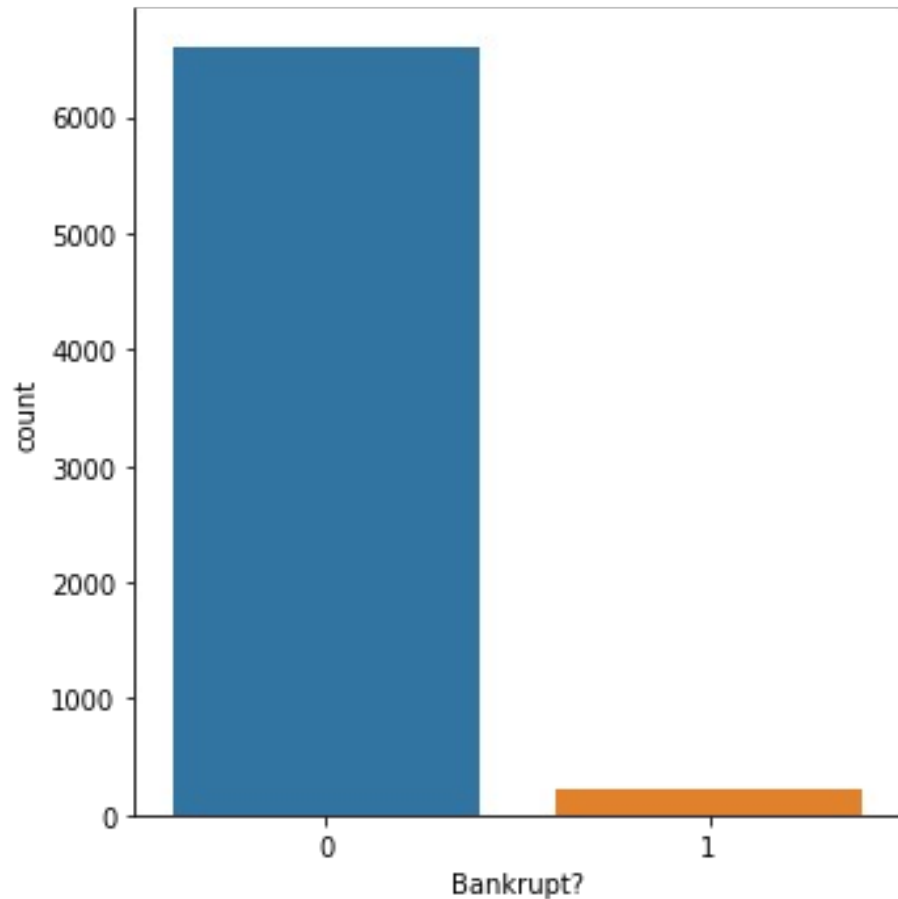
Exploratory Data Analysis

Most variables are skewed or/and have high kurtosis. Some of them have outliers on one or both sides. All the numerical variables have mean that differs between target classes.

Feature Engineering and Selection

- Original features' distribution

- Shuffle feature selection didn't give any insight because all the features reduced the score by only 0.01 to 0.025.

- Ordering features by single feature prediction and then iteratively selecting k best features gave ROC AUC score of 0.9561 and reduced nubmer of features to 17.
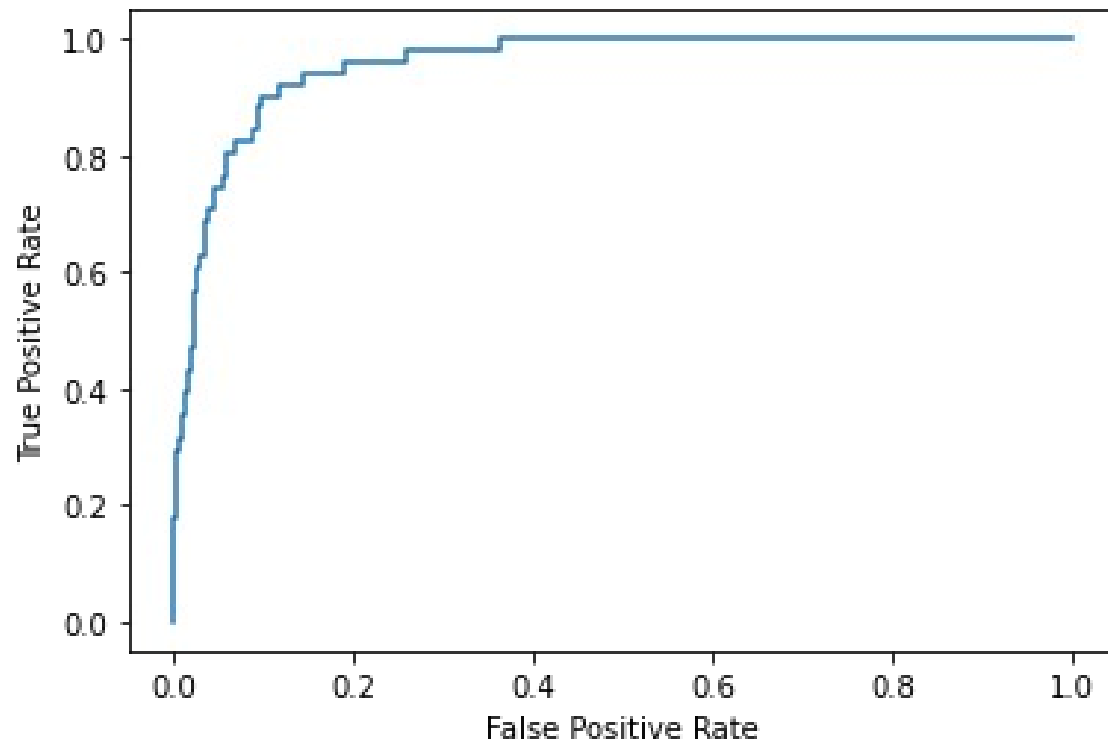
Performance

	precision	recall	f1-score	support
0	0.97	1.00	0.98	1313
1	0.80	0.24	0.36	51
accuracy			0.97	1364
macro avg	0.89	0.62	0.67	1364
weighted avg	0.96	0.97	0.96	1364
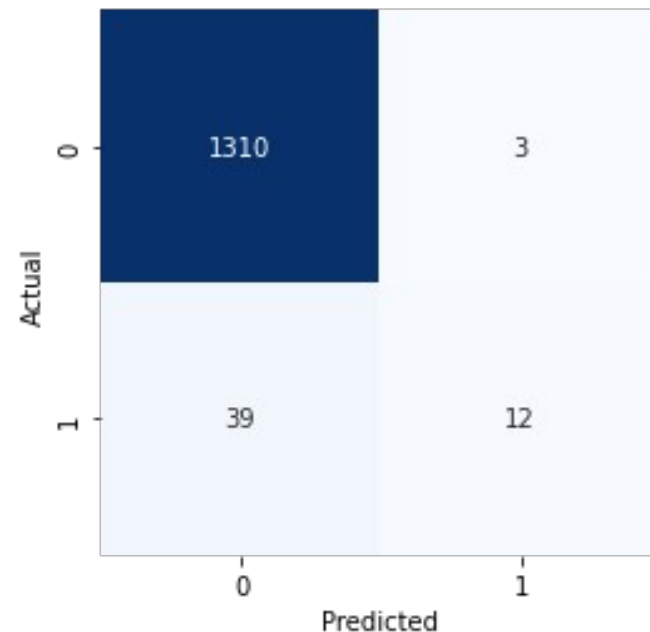
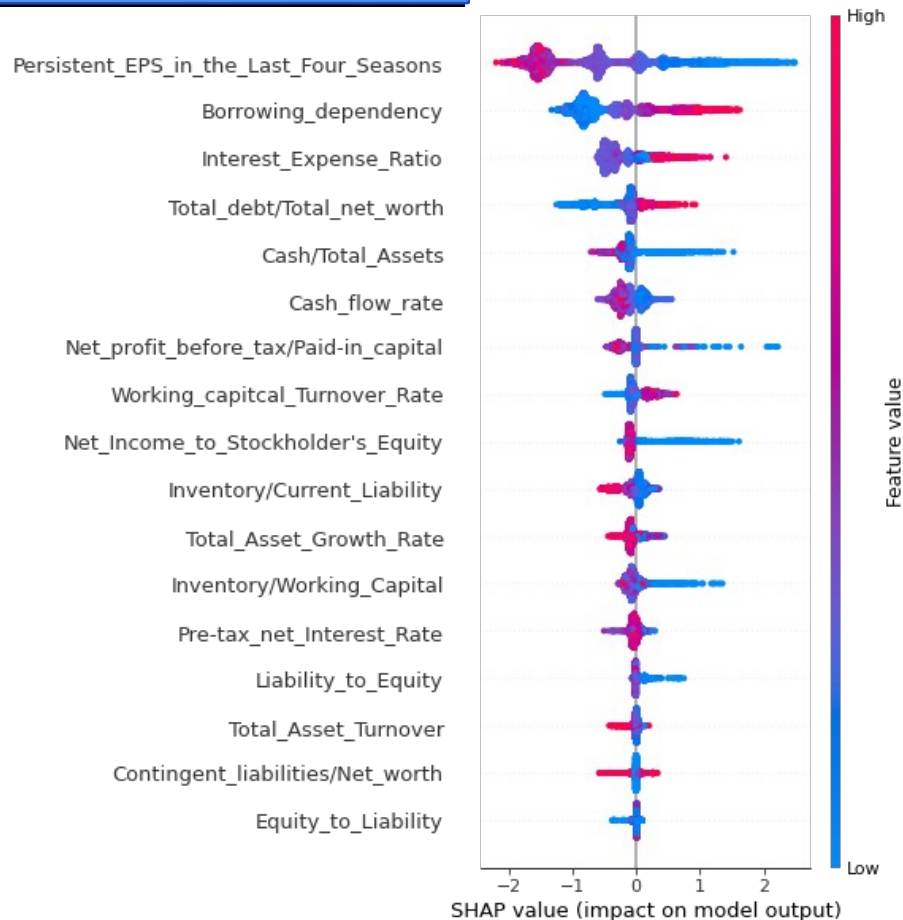Probability cutoff 0.5 results in precision 0.80 and recall 0.24.

Performance

ROC AUC score: 0.9561

Feature Importance

Most influencing variables by SHAP are:
Persistent_EPS_in_the_Last_Four_Seasons,
Borrowing_dependency,
Interest_Expense_Ratio,
Total_debt/Total_net_worth,
Cash/Total_Assets and
Cash_flow_rate.

Summary and Conclusions

- XGBoost modeling with 95 features gave ROC AUC score of 0.9592.

- Shuffle feature selection didn't give any insight because all the features reduced the score by only 0.01 to 0.025.

- Ordering features by single feature prediction and then iteratively selecting k best features gave ROC AUC score of 0.9561 and reduced nubmer of features to 17.

The end

Thank you for your attention!