学位論文内容の要旨

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学位論文題名

Bankruptcy Prediction Model Using Machine Learning

(機械学習による倒産予知モデル)

The aim of this study is to build a neural network model that can classify a company as “bankrupted” or “non-bankrupted” using a small dataset with multiple types of variables. Quantitative or qualitative information only is not sufficient when evaluating the financial situation of company. Previous studies focused on the use of financial ratios to build bankruptcy prediction models, although in practice, non-financial and qualitative information are analyzed in parallel. This study presents a model using machine learning, namely neural networks, to show that quantitative data and qualitative data extracted from texts can be combined into single model and performs better than when using a single type of variable.

Moreover, machine learning generally requires a large volume of data to properly learn and avoid overfitting. However, in bankruptcy prediction studies, large datasets are seldom available. In this study, we used a small sized dataset where the number of variables is exceedingly higher than the number of observations and introduced machine learning methods to mild the effect of the small dataset.

As quantitative data, we used the most common financial ratios used in literature and practice. As qualitative data, we used extracted texts from relevant sections in securities reports of Japanese listed companies. The results showed that neural networks can be used to predict bankruptcy, whether using only financial ratios or only texts as variables. However, the accuracy drastically decreases when those data are combined into a single data frame. We found out that using ensemble learning, a method fusing multiple algorithms, can solve this problem and yields the highest level of prediction accuracy.