**MACHINE LEARNING MODELS FOR PREDICTING FINANCIAL DISTRESS**

Joseph BONELLO[[1]](#footnote-1)

Xavier BRÉDART[[2]](#footnote-2)

Vanessa VELLA[[3]](#footnote-3)

**Abstract**

*Difficulties in business liquidity and the consequent financial distress are usually an extremely costly and disruptive event. For this reason, this study attempts to provide a set of features that can help us predict the sustainability of a company. This study involves the building of a financial prediction system which after training on a set of companies’ historical final accounts (ranging over a period of 3 to 5 years), the models built are then capable of evaluating the nature of another companies’ financial data. Consequently, the company’s financial position in the following financial period is predicted: whether a company is active or failing. After predicting firm financial health, the outputs of the Decision Tree, the Naïve Bayes classifier and the Artificial Neural Net are evaluated to see which algorithm is the most accurate in finding a set of features for this problem. The research findings over a real-life datasets confirmed the strength and ability of the proposed model in predicting eminent business failure. Moreover, Base-year and year-over-year comparison both produce good results, therefore both techniques can be used for financial analysis. The optimal feature set included ratios from all categories, meaning, company profitability, liquidity, leverage, management efficiency, industry type and company size are all crucial to distress prediction. The prototype implemented in this study attempts to answer open questions, such as whether ML techniques are capable of predicting financial distress and whether financial ratios and industry variables are indicative of financial sustainability.*

**Keywords:** *Financial distress, financial ratios, Set of Final Accounts, Decision Trees, Naïve Bayes, Artificial Neural Networks, Base-year comparison, Previous-year comparison, Accuracy.*

**JEL Classification:** *M40, C80.*

1. University of Malta, Faculty of Information & Communication Technology. [↑](#footnote-ref-1)
2. University of Mons, Warocqué School of Business and Economics, Belgium. [↑](#footnote-ref-2)
3. Software Engineer, Malta. [↑](#footnote-ref-3)