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Corporate failure prediction of JSE listed South African firms using machine learning (A credit risk management approach)

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Abstract

Corporate failure has increasingly become an area of interest to regulatory authorities, policy makers, lending institutions and private investors around the world. In South Africa, the deterioration of key macro-economic factors has raised the probability of credit defaults due to corporate failures. The aim of this study is to analyse, improve and expand prior work in the prediction of corporate failure in South Africa in order to develop a bankruptcy prediction model that can help predict corporate failure for listed companies in order to manage credit risk better. A sample of 366 companies listed on the JSE between 1997 and 2017 was used. This included 66 companies declared bankrupt during the period under investigation. Based on 72 financial variables, the results indicate that machine learning techniques outperformed statistical models by an additional 12% in prediction accuracy. The artificial neural network model yielded the highest accuracy score of 92%, followed by random forest models at 89% and support vector machine models at 87%. Results of this study may be of interest for financial institutions providing loans and for academics in machine learning prediction algorithms.