The Relationship Between Machine Learning and Firms' Financial Performance: An Applied Study on Jordanian Commercial Banks

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Abstract

This research aims to assess the use of machine learning (ML) methods in enhancing financial decision-making and improving financial performance in Jordanian commercial banks. This research included a meticulous assessment of several machine learning models, such as XGBoost and Random Forest, which were trained using historical financial data from 2007 to 2021. This data encompassed many financial performance measures. The models underwent optimization and validation using conventional machine-learning techniques to guarantee their resilience and accuracy in making predictions.

The primary results indicate that the XGBoost model had exceptional performance, achieving an R-squared value of 0.9918, which signifies its exceptional prediction accuracy. The performance of this model in predicting financial outcomes was notably superior to that of standard statistical models, as shown by its low error measures, including Mean Absolute Error (MAE) and Root Mean Squared Error (RMSE). Furthermore, the sensitivity analysis revealed the influence of economic parameters such as inflation rates and GDP on financial performance indicators, offering vital insights into the economic interdependencies of bank profitability. The findings of this research have implications for both the theoretical and practical elements of financial analysis. This study contributes to the existing research on machine learning in analyzing financial

performance by proving the effectiveness of these models in a practical banking setting. It provides a strong structure for financial institutions to improve their ability to analyze and predict outcomes, resulting in better strategic decision-making based on well-informed information.

Keywords: Machine Learning, Financial Performance, XGBoost, Jordanian Banks, Predictive Analytics.