

ABSTRACT

Stock price prediction is an crucial aspect of investment decision-making due to its volatile and nonlinear behavior. This study aims to predict the closing stock price of PT Indofood Sukses Makmur Tbk using an Extreme Gradient Boosting (XGBoost) model optimized with Optuna. The study uses daily stock price data from January 2, 2019, to November 29, 2024, with Open, High, Low, and Volume as independent variables and the Close price as the dependent variable. This study applies Principal Component Analysis (PCA) as a data pre-processing step to reduce correlation and redundancy among independent variables. The dataset is divided using a time series split scheme, allocating 80% of the data for training and 20% for testing. XGBoost model with PCA pre-processing without hyperparameter optimization is used as the baseline model, while XGBoost model with PCA pre-processing and Optuna-based optimization is employed as the main model. Model performance is evaluated using the coefficient of determination (R^2). The results show that the XGBoost model with PCA pre-processing without optimization achieves R^2 value of 84.15% with a MAPE of 8.0844%, whereas the XGBoost model with PCA pre-processing optimized using Optuna achieves R^2 value of 86.83% with a MAPE of 8.0432%. The improvement in R^2 indicates that Optuna-based hyperparameter optimization enhances the model's ability to capture nonlinear patterns in stock price data. These findings suggest that applying PCA as a pre-processing step and Optuna-based optimization within the XGBoost model provides an effective approach for stock price prediction and supports data-driven investment decision-making in capital markets.

Keywords: *Stock Price Prediction, PT Indofood Sukses Makmur Tbk, XGBoost, Optuna, PCA, R^2*