SKRIPSI

ANALISIS PERGERAKAN DAN PREDIKSI HARGA SAHAM MENGGUNAKAN ALGORITMA *RANDOM FOREST* DENGAN *BAYESIAN OPTIMIZATION HYPERPARAMETER TUNING* (Studi Kasus: Harga Saham Harian PT Bank Central Asia Tbk)

Analysis of Movement and Prediction of Stock Price Using Random Forest Algorithm With Bayesian Optimization Hyperparameter Tuning (Case Study: Daily Stock Prices of PT Bank Central Asia Tbk)

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HALAMAN PENGESAHAN

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ABSTRAK

ANALISIS PERGERAKAN DAN PREDIKSI HARGA SAHAM MENGGUNAKAN ALGORITMA *RANDOM FOREST* DENGAN *BAYESIAN OPTIMIZATION HYPERPARAMETER TUNING* (Studi Kasus: Harga Saham Harian PT Bank Central Asia Tbk)

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Pasar saham memiliki karakteristik yang sangat dinamis, non-linear, dan penuh ketidakpastian, sehingga penggunaan metode peramalan konvensional sering kali tidak efektif dalam menangkap pola tersembunyi pada data runtun waktu (*time series*). Penelitian ini bertujuan untuk mengembangkan dan membandingkan kinerja model *machine learning Random Forest* (RF) dan *Bayesian Optimization-Random Forest* (BO-RF) terhadap data harga saham harian PT Bank Central Asia Tbk (kode saham: BBCA) pada periode 1 Oktober 2019 hingga 1 Oktober 2025. Hasil penelitian menunjukkan bahwa pada tahap prediksi data harga penutupan terdiferensiasi, model RF gagal menangkap pola dalam data olahan, ditunjukkan dengan perolehan nilai koefisien determinasi sebesar $-7{,}99\%$, sedangkan model BO-RF berhasil mendapatkan nilai koefisien determinasi sebesar $1{,}26\%$ yang menunjukkan peranan *Bayesian Optimization Hyperparameter Tuning* signifikan dan efektif dalam meningkatkan performa model RF. Dalam memprediksi harga penutupan harian, model BO-RF bekerja sangat baik dengan memperoleh nilai MAPE sebesar $1{,}23\%$ dan koefisien determinasi sebesar $96{,}33\ \%$, membuktikan bahwa model BO-RF merupakan model prediksi yang dapat diandalkan dan mampu memperoleh tingkat akurasi yang tinggi dalam memprediksi harga penutupan harian saham.

Kata kunci: *Machine Learning*, *Random Forest, Bayesian Optimization, Hyperparameter Tuning*.

ABSTRACT

Analysis of Movement and Prediction of Stock Price Using Random Forest Algorithm With Bayesian Optimization Hyperparameter Tuning
(*Case Study: Daily Stock Prices of PT Bank Central Asia Tbk*)

by

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The stock market possesses hihgly dynamic, non-linear, and uncertain characteristics; consequently, the application of traditional forecasting methodologies frequently proves inadequate in capturing hidden patterns within time series datasets. This study aims to develop and compare the performance of Random Forest (RF) and Bayesian Optimization-Random Forest (BO-RF) machine learning models for predicting daily stock prices of PT Bank Central Asia Tbk (stock code: BBCA) over the observation period from 1 October 2019 to 1 October 2025. The findings indicated that during the prediction phase of the differentiated closing price data, the RF model was unable to discern the underlying pattern in the processed data, as evidenced by a coefficient of determination value of -7.99%*, whereas the BO-RF model successfully achieved a coefficient of determination of* 1.26%*, thereby underscoring the significant and efficacious contribution of Bayesian Optimization Hyperparameter Tuning in enhancing the performance of the RF model. In predicting daily closing prices, the BO-RF model performed exceptionally well by attaining a MAPE value of* 1.23% *and a coefficient of determination of* 96.33%*, proving that the BO-RF model is a reliable prediction model capable of achieving high accuray in predicting daily stock closing prices.*

Keywords: Machine Learning, Random Forest, Bayesian Optimization, Hyperparameter Tuning.