

INTISARI

**OPTIMISASI PORTOFOLIO MANTA RAY FORAGING DENGAN
PREDIKSI RETURN HIPPOPOTAMUS
OPTIMIZATION-CONVOLUTIONAL NEURAL
NETWORK-ATTENTION-LONG SHORT TERM MEMORY (HO-CAL)
BERDASARKAN KLASTER K-MEDOIDS**

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Potensi *return* yang tinggi menjadikan pasar modal menarik bagi investor. Oleh karena itu, diperlukan strategi pembentukan portofolio yang optimal dengan mempertimbangkan keseimbangan antara risiko dan *return*. Penelitian ini mengusulkan integrasi model *Hippopotamus Optimization–Convolutional Neural Network–Attention–Long Short Term Memory* (HO-CAL) untuk prediksi *return* saham dan *Manta Ray Foraging Optimization* (MRFO) untuk optimisasi portofolio, dengan klasterisasi saham menggunakan metode *K-Medoids* guna meningkatkan efisiensi dan akurasi. Data yang digunakan berupa harga penutupan 25 saham indeks SRI-KEHATI periode Maret 2023–Agustus 2025 yang diperoleh dari *Yahoo Finance*. Algoritma *Hippopotamus Optimization* digunakan untuk mengoptimasi hiperparameter pada model CNN–Attention–LSTM sehingga menghasilkan nilai MAE, MSE, dan RMSE yang lebih rendah dibandingkan model CAL. Pada tahap optimisasi, empat metode dibandingkan, yaitu *Manta Ray Foraging Optimization*, *Particle Swarm Optimization*, *Genetic Algorithm*, dan *Mean-Variance*. Kombinasi HO-CAL dan MRFO menunjukkan kinerja terbaik dengan *expected return* tahunan sebesar 21,29%, *Sharpe ratio* 0,97666, dan *Sortino ratio* 1,29443. Hasil penelitian ini membuktikan bahwa integrasi HO-CAL dan MRFO efektif menghasilkan portofolio saham yang lebih akurat, efisien, serta unggul dalam manajemen risiko dan profitabilitas.

Kata Kunci: Prediksi *Return* Saham, *Hippopotamus Optimization*, CNN-Attention-LSTM, *Manta Ray Foraging Optimization*, Optimisasi Portofolio.

ABSTRACT

MANTA RAY FORAGING PORTFOLIO OPTIMIZATION WITH RETURN PREDICTION USING HIPPOPOTAMUS OPTIMIZATION-CONVOLUTIONAL NEURAL NETWORK-ATTENTION-LONG SHORT TERM MEMORY (HO-CAL) BASED ON K-MEDDOIDS CLUSTERING

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High return potential makes capital markets attractive to investors. Constructing a portfolio that balances return and risk is therefore a central objective in financial decision-making. This study proposes an integrated framework that combines Hippopotamus Optimization with a CNN–Attention–LSTM model for stock return prediction and applies Manta Ray Foraging Optimization for portfolio allocation. To improve model efficiency and accuracy, K-Medoids clustering is used to group stocks into more homogeneous categories. The dataset consists of daily closing prices for 25 SRI-KEHATI index constituents from March 2023 to August 2025, obtained from Yahoo Finance. Hippopotamus Optimization is employed to tune hyperparameters of the predictive model, resulting in lower MAE, MSE, and RMSE compared with the baseline framework. Four portfolio optimization methods, namely Manta Ray Foraging Optimization, Particle Swarm Optimization, Genetic Algorithm, and Mean–Variance Optimization, are evaluated. The combined HO–CAL and MRFO framework demonstrates the strongest performance, achieving an annual expected return of 21.29%, a Sharpe ratio of 0.97666, and a Sortino ratio of 1.29443. Overall results show that the proposed framework supports the construction of more accurate and efficient stock portfolios and provides meaningful benefits for risk management and investment profitability.

Keywords: Stock Return Prediction, Hippopotamus Optimization, CNN-Attention-LSTM, Manta Ray Foraging Optimization, Portfolio Optimization.