ABSTRAK

Saham sektor teknologi, khususnya NVIDIA Corporation (NVDA), memiliki karakteristik volatilitas ekstrem yang dipengaruhi oleh sentimen industri Artificial Intelligence (AI). Kondisi fluktuatif ini menyebabkan metode prediksi konvensional seringkali gagal menangkap tren non-linear. Penelitian ini bertujuan membangun model prediksi harga saham menggunakan algoritma Bidirectional Long Short-Term Memory (Bi-LSTM) untuk mengatasi masalah tersebut. Fokus utama penelitian adalah menganalisis pengaruh penambahan fitur teknikal (RSI, ATR, Volatility) terhadap akurasi model, serta menentukan konfigurasi hyperparameter dan window size yang paling optimal dalam menangkap pola data yang dinamis.

Penelitian ini membandingkan sepuluh skenario model dengan variasi fitur input, arsitektur, dan rentang data historis (2018-2024). Pendekatan eksperimental dilakukan untuk menguji fenomena feature redundancy, yaitu apakah penambahan indikator teknikal memperkaya informasi atau justru menjadi noise. Selain itu, penelitian ini juga memvalidasi keunggulan arsitektur Bi-LSTM dibandingkan LSTM standar, serta menguji sensitivitas model terhadap memori jangka pendek dan panjang melalui variasi window size (30 hari dan 60 hari) pada kondisi data terbatas maupun lengkap.

Hasil pengujian menunjukkan adanya fenomena feature redundancy, di mana penambahan seluruh indikator teknikal pada window panjang justru menurunkan akurasi (MAPE 2.34%) dibandingkan model baseline tanpa indikator (MAPE 2.32%). Temuan terpenting penelitian ini adalah signifikansi data historis dan sensitivitas memori jangka pendek. Model terbaik (Model J) dicapai melalui kombinasi data historis lengkap, seleksi parameter teroptimasi, dan penggunaan window size pendek (30 hari). Konfigurasi ini menghasilkan tingkat kesalahan terendah dengan RMSE 3.1321 dan MAPE 2.296%, serta akurasi arah tren (Directional Accuracy) sebesar 57.19%. Penelitian menyimpulkan bahwa pada saham dengan volatilitas tinggi, kemampuan adaptasi model untuk menghasilkan prediksi yang akurat melalui window size yang lebih pendek lebih krusial dibandingkan kompleksitas fitur.

Kata Kunci Bidirectional LSTM, Prediksi Harga Saham, NVIDIA, Analisis Teknikal, Feature Selection, Deep Learning,.

ABSTRACT

Technology sector stocks, particularly NVIDIA Corporation (NVDA), are characterized by extreme volatility driven by sentiments in the Artificial Intelligence (AI) industry. This fluctuating condition causes conventional prediction methods to struggle in capturing non-linear trends. This study aims to build a stock price prediction model using the Bidirectional Long Short-Term Memory (Bi-LSTM) algorithm to address this issue. The primary focus is to analyze the effect of adding technical features (RSI, ATR, Volatility) on model accuracy, as well as to determine the most optimal hyperparameter and window size configurations for capturing dynamic data patterns.

The study compares ten modeling scenarios varying in input features, architecture, and historical data ranges (2018-2024). An experimental approach was conducted to test the phenomenon of feature redundancy—whether adding technical indicators enriches information or acts as noise. Furthermore, this study validates the superiority of the Bi-LSTM architecture over standard LSTM and tests the model's sensitivity to short-term and long-term memory through variations in window size (30 days and 60 days) under both limited and complete data conditions.

The results reveal a feature redundancy phenomenon, where adding comprehensive technical indicators on a long window actually reduced accuracy (MAPE 2.34%) compared to the baseline model without indicators (MAPE 2.32%). The most significant finding is the importance of historical data depth and short-term memory sensitivity. The best-performing model (Model J) was achieved through a combination of complete historical data, optimized parameters, and a short window size (30 days). This configuration yielded the lowest error rates with an RMSE of 3.1321 and a MAPE of 2.296%, along with a Directional Accuracy of 57.19%. The study concludes that for highly volatile stocks, model’s adaptive accuracy through a shorter window size is more critical than feature complexity.

Keywords: Bidirectional LSTM, Stock Price Prediction, NVIDIA, Technical Analysis, Feature Selection, Deep Learning.