

ABSTRAK

Emas merupakan instrumen investasi pelindung nilai (*safe haven*) yang harganya sangat dinamis dan sulit diprediksi karena sangat dipengaruhi oleh kondisi ketidakpastian ekonomi global serta dinamika sentimen publik. Pendekatan perhitungan konvensional sering kali mengalami keterbatasan dalam menangkap pola hubungan non-linear yang kompleks antara data angka dan data teks opini masyarakat di internet. Oleh karena itu, penelitian ini bertujuan untuk mengevaluasi dan membandingkan kinerja kecerdasan buatan, khususnya algoritma *Neural Network* arsitektur *Multilayer Perceptron* dan *Long Short-Term Memory*, dalam melakukan klasifikasi sentimen sekaligus memprediksi arah pergerakan harga emas secara akurat. Penelitian kuantitatif komparatif ini menggunakan lima variabel prediktor utama: skor sentimen teks dari platform Twitter, harga emas global, Indeks S&P 500, kurs Dolar AS, dan tingkat suku bunga The Fed, dengan periode pengamatan Januari hingga Desember 2025. Pengolahan data teks opini publik dilakukan melalui tahapan *preprocessing* berjenjang dan ekstraksi fitur *Term Frequency-Inverse Document Frequency*, sedangkan penyelarasan data numerik makroekonomi diproses menggunakan metode *Min-Max Scaler*. Model dilatih menggunakan teknik penataan *sliding window* dengan laju pembelajaran optimasi *Nadam*, lalu dievaluasi kinerjanya menggunakan simulasi pergerakan waktu *Walk-Forward Validation* dengan skema pembagian 80% data latih dan 20% data uji. Hasil pengujian membuktikan bahwa kedua arsitektur *Neural Network* memiliki kinerja yang sangat baik dengan tingkat kesalahan berada jauh di bawah ambang batas toleransi 10%. Evaluasi metrik *Mean Absolute Percentage Error* (MAPE) pada pengujian model murni menunjukkan bahwa algoritma LSTM memiliki tingkat kesalahan terendah sebesar 2,0605%, mengungguli MLP (2,1631%) dan metode dasar *Naive* (2,2923%). Keunggulan serupa juga terlihat pada skenario prediksi model *Hybrid*, di mana LSTM mencetak nilai MAPE 2,1649% dibandingkan MLP yang memperoleh 2,2787%.

Kata Kunci: Harga Emas, Analisis Sentimen, Jaringan Saraf Tiruan, *Multilayer Perceptron*, *Long Short-Term Memory*, Peramalan.

ABSTRACT

Gold is a safe-haven investment instrument with highly dynamic and difficult-to-predict prices, primarily driven by global economic uncertainty and public sentiment dynamics. Conventional calculation approaches often face limitations in capturing the complex non-linear relationships between numerical data and public opinion text data on the internet. Therefore, this study aims to evaluate and compare the performance of artificial intelligence, specifically the Multilayer Perceptron (MLP) and Long Short-Term Memory Neural Network architectures, in classifying sentiment and accurately predicting the direction of gold price movements. This comparative quantitative research utilizes five main predictor variables: text sentiment scores from the Twitter platform, global gold prices, the S&P 500 Index, the US Dollar exchange rate, and the Federal Reserve interest rate, with an observation period from January to December 2025. Public opinion text data was processed through sequential preprocessing stages and Term Frequency-Inverse Document Frequency feature extraction, while macroeconomic numerical data was normalized using the Min-Max Scaler method. The models were trained using a sliding window technique optimized by the Nadam algorithm, and their performance was evaluated using a Walk-Forward Validation time-series simulation with an 80% training and 20% testing data split. The test results demonstrated that both Neural Network architectures performed exceptionally well, with error rates falling well below the 10% tolerance threshold. Evaluation using the Mean Absolute Percentage Error (MAPE) metric on pure model testing showed that the LSTM algorithm achieved the lowest error rate at 2.0605%, outperforming MLP (2.1631%) and the baseline Naive method (2.2923%). A similar advantage was also observed in the Hybrid model prediction scenario, where the LSTM recorded a MAPE of 2.1649% compared to the MLP's 2.2787%.

Keywords: Gold Price, Sentiment Analysis, Artificial Neural Network, Multilayer Perceptron, Long Short-Term Memory, Forecasting.