

ABSTRACT

Gold investment is one of the most favored investment instruments as gold is widely regarded as a safe haven asset. The gold price of PT Aneka Tambang Tbk (ANTAM) in Indonesia experienced extreme volatility during the 2020–2025 period, driven by the COVID-19 pandemic, and strong demand for gold as a safe haven asset amid global economic instability. These fluctuations produced non-stationary and non-linear data characteristics that conventional methods fail to model accurately. This condition underscores the need for machine learning-based approaches, which have proven superior in capturing complex patterns in time series data, particularly under highly volatile market conditions. This study aims to predict the daily gold price of ANTAM using a Long Short-Term Memory (LSTM) model optimized with the random search method. Secondary data of daily ANTAM gold prices consisting of 1.519 observations were divided into 90% training data and 10% testing data. Data preprocessing includes min-max normalization and the application of a sliding window technique with a window size of 12. Hyperparameter optimization was conducted using random search over 20 trials, covering the number of layers, units, dropout rate, learning rate, batch size, and epochs. The best configuration achieved a validation loss of 0,000184. The model evaluation using Mean Absolute Percentage Error (MAPE) resulted in 0.72% on training data and 0.62% on testing data, both categorized as excellent forecasting accuracy. These results demonstrate that the developed model effectively captures gold price movement patterns and holds strong potential as a reliable tool for gold investment decision-making.

Keywords: Gold price, *Long Short-Term Memory*, *Random Search*, *Hyperparameter Tuning*, MAPE