ABSTRACT

Stock prices data are financial time series data with complex movements due to their linear and non-linear patterns. Accurate stock price forecasting is crucial for investors in strategic decision-making. This study aims to model and forecast NVIDIA (NVDA) stock prices using a hybrid method that combines the advantages of the Autoregressive Integrated Moving Average (ARIMA) and Artificial Neural Network (ANN) models. The ARIMA method is used to capture linear patterns from the data, while the ANN is used to model the remaining non-linear patterns from the ARIMA residuals. NVIDIA's daily stock price data for the period September 21, 2022, to August 14, 2025, was used in this study. After going through the identification, estimation, and diagnostic testing stages, the ARIMA([1,14], 1, [1,14]) model was selected as the best linear model with an AIC value of 94.76. The residuals from this model were then modeled using an ANN with a (5-2-1) architecture trained using the backpropagation algorithm. The results show that the hybrid ARIMA-ANN model has superior accuracy compared to the single ARIMA model. This is evidenced by the smaller Mean Absolute Percentage Error (MAPE) value of the hybrid model, which is 8,776%, compared to the MAPE of the ARIMA model of 9,360%. This increase in accuracy indicates that the combined ANN model successfully captures non-linear patterns that ARIMA cannot model, resulting in more accurate forecasts.

Keywords: Stock Prices, Forecasting, ARIMA, Artificial Neural Network, Hybrid, AIC, MAPE