

Perkembangan investasi saham di Indonesia mengalami perubahan seiring waktu. Saham menjadi instrumen investasi yang populer karena memiliki potensi keuntungan besar, namun dengan risiko kerugian tinggi. Perkembangan ekonomi Indonesia yang relatif melambat pada lima tahun ke belakang menyebabkan pergerakan harga saham LQ45 mengalami kenaikan dan penurunan signifikan yang menyebabkan *volatility* harga saham LQ45 menjadi beragam. Dalam kondisi ini, analisis tren dan musiman harga saham penting untuk memprediksi pola pergerakan harga saham untuk mempermudah kegiatan jual beli saham. Analisis tren dan musiman dapat dilakukan dengan sekaligus meramalkan harga saham menggunakan Facebook Prophet dan Neural Prophet. Dalam memperoleh model dengan performa terbaik dengan kedua algoritma tersebut membutuhkan optimisasi *hyperparameter* dan pemilihan lamanya peramalan harga saham yang sesuai.

Metode yang digunakan pada penelitian ini menggunakan metode perbandingan performa pada Facebook Prophet dan Neural Prophet. Data harga saham LQ45 diperoleh dari portal Yahoo Finance menggunakan *library* Yfinance pada Python. Data runtun waktu harga saham LQ45 pada rentang 28 Januari 2013 hingga 27 Januari 2023 kemudian dilakukan analisis *volatility* dan korelasi untuk memilih sampel pada penelitian dengan cakupan empat saham yang beragam, yaitu saham berkode BBKA, INDY, ADHI, dan LP-PF. Keempat data runtun waktu tersebut kemudian dilakukan praproses dengan mengisi nilai yang hilang menggunakan metode *backfilling* dan praproses tabularisasi data. Perolehan parameter terbaik melalui *hyperparameter tuning* dilakukan secara manual dengan masukan parameter-parameter pada kedua algoritma dan luaran berupa metrik pengujian performa MAPE (*Mean Absolute Percentage Error*), MAE (*Mean Average Error*), dan RMSE (*Root Mean Squared Error*). Analisis hasil pengujian performa juga meliputi analisis ragam *volatility* dan horizon. Horizon yang digunakan adalah satu bulan dan tiga bulan ke depan.

Terdapat pengaruh *volatility*, *horizon*, dan *hyperparameter tuning* dalam optimisasi model Facebook Prophet dan Neural Prophet. Pada saham dengan *volatility* terendah (BBKA) dengan *volatility* 20,3556 memiliki performa model terbaik pada Neural Prophet (MAPE = 1,2002%, MAE = 92,9930, RMSE = 120,1492, dan *horizon* satu bulan). Pada saham dengan *volatility* tertinggi (LPPF) dengan *volatility* 61,0141 memiliki performa model terbaik pada Neural Prophet (MAPE = 4,6621%, MAE = 205,1116, RMSE = 246,3285, dan *horizon* satu bulan). Pada saham INDY dengan *volatility* 49,6266 memiliki performa model terbaik pada Neural Prophet (MAPE = 10,6903%, MAE = 294,2539, RMSE = 310,7051, dan *horizon* satu bulan). Pada saham ADHI dengan *volatility* 38,3895 memiliki performa model terbaik pada Neural Prophet (MAPE = 5,9869%, MAE = 45,4509, RMSE = 53,0652, dan *horizon* satu bulan). Sehingga dalam memperoleh peramalan, analisis tren, dan analisis musiman harga saham pada LQ45 dapat dilakukan dengan baik menggunakan Neural Prophet dengan *horizon* satu bulan, setelah melalui optimisasi *hyperparameter tuning*, dan dengan *volatility* yang relatif rendah.

Kata kunci : Facebook Prophet, Neural Prophet, peramalan harga saham, analisis tren, analisis musiman, *hyperparameter tuning*, *volatility*, *horizon*

ABSTRACT

The development of stock investments in Indonesia changes over time. Stocks have become a popular investment instrument due to their potential for significant profits, but also with high risks of losses. The relatively slow economic development in Indonesia over the past five years has caused significant fluctuations in the prices of LQ45 stocks, leading to varied volatility. In this context, trend and seasonal analysis of stock prices is important for predicting price movement patterns to facilitate stock trading activities. Trend and seasonal analysis can be performed by forecasting stock prices simultaneously using Facebook Prophet and Neural Prophet. Obtaining the best-performing model with both algorithms requires hyperparameter optimization and selecting an appropriate forecast length.

The method used in this study was comparing the performance of Facebook Prophet and Neural Prophet. LQ45 stock price data was obtained from the Yahoo Finance portal using Yfinance library in Python. Time series data of LQ45 stock prices from 28 January 2013 until 27 January 2023. Then, the stock prices are analyzed for volatility and correlation to select samples for the study. The selected stocks are BBKA, INDY, ADHI, and LPPF. These four time series data were preprocessed by filling in missing values using the backfilling method and tabularizing the data. The best parameters were obtained through manual hyperparameter tuning by inputting parameters into the models proposed, and the output included performance testing metrics such as MAPE (Mean Absolute Percentage Error), MAE (Mean Average Error), and RMSE (Root Mean Squared Error). Performance testing analysis also included volatility and horizon analysis. The horizons used were one month and three months ahead.

There is an influence of volatility, horizon, and hyperparameter tuning in optimizing Facebook Prophet and Neural Prophet models. For the stock with the lowest volatility (BBKA) at 20.3556, the best-performing model was observed in Neural Prophet (MAPE = 1.2002%, MAE = 92.9930, RMSE = 120.1492, with a one-month horizon). For the stock with the highest volatility (LPPF) at 61.0141, the best-performing model was observed in Neural Prophet (MAPE = 4.6621%, MAE = 205.1116, RMSE = 246.3285, with a one-month horizon). For INDY stock with volatility at 49.6266, the best-performing model was observed in Neural Prophet (MAPE = 10.6903%, MAE = 294.2539, RMSE = 310.7051, with a one-month horizon). For ADHI stock with volatility at 38.3895, the best-performing model was observed in Neural Prophet (MAPE = 5.9869%, MAE = 45.4509, RMSE = 53.0652, with a one-month horizon). Therefore, for forecasting, trend analysis, and seasonal analysis of LQ45 stock prices, Neural Prophet can be effectively used with a one-month horizon, after undergoing hyperparameter tuning, and with relatively low volatility.

Keywords : Facebook Prophet, Neural Prophet, stock price forecasting, trend analysis, seasonality analysis, hyperparameter tuning, volatility, horizon