INTISARI

METODE *HYBRID EMPIRICAL MODE DECOMPOSITION* DAN *LEAST SQUARE SUPPORT VECTOR REGRESSION* (EMD-LSSVR) UNTUK PERAMALAN NILAI TUKAR MATA UANG

Oleh

Diva Kemala

20/455514/PA/19729

Memperkiraan nilai tukar mata uang secara akurat memiliki tantangan tersendiri untuk dilakukan karena data runtun waktu keuangan umumnya bersifat nonstasioner dan nonlinear akibat fluktuasi yang disebabkan oleh peristiwa politik dan ekonomi. Dalam skripsi ini, dilakukan peramalan untuk data bulanan dari bulan Januari 2001 hingga Februari 2024 pada data nilai tukar dolar Amerika Serikat terhadap rupiah Indonesia (USD/IDR) dan nilai tukar yen Jepang terhadap rupiah Indonesia (JPY/IDR) dengan mengombinasikan metode *Empirical Mode Decomposition* (EMD) dan *Least Square Support Vector Regression* (LSSVR). Penentuan parameter optimal untuk LSSVR dilakukan dengan bantuan algoritma *Particle Swarm Optimization* (PSO). Kinerja model prediksi dari metode gabungan EMD-LSSVR ini kemudian dibandingkan dengan metode ARIMA dan LSSVR menggunakan beberapa metrik evaluasi, seperti *Mean Square Error* (MSE), *Root Mean Square Error* (RMSE), *Mean Absolute Error* (MAE), dan *Mean Absolute Percentage Error* (MAPE). Hasilnya menunjukkan bahwa metode gabungan EMD-LSSVR konsisten menghasilkan akurasi prediksi yang lebih baik dibandingkan metode lainnya untuk kedua data USD/IDR dan JPY/IDR.

Kata Kunci: Nilai tukar mata uang, *Empirical Mode Decomposition* (EMD), *Least Square Support Vector Regression* (LSSVR), EMD-LSSVR.

ABSTRACT

HYBRID EMPIRICAL MODE DECOMPOSITION AND LEAST SQUARE SUPPORT VECTOR REGRESSION (EMD-LSSVR) METHODS FOR EXCHANGE RATES FORECASTING

By

Diva Kemala

20/455514/PA/19729

Accurately forecasting currency exchange rates has its own challenges to do because financial time series data are generally nonstationary and nonlinear due to fluctuations caused by political and economic events. In this study, forecasting is conducted for the monthly exchange rate data of the United States dollar against the Indonesian rupiah (USD/IDR) and the exchange rate data of the Japanese yen against the Indonesian rupiah (JPY/IDR) from Januari 2001 to February 2024 by combining the Empirical Mode Decomposition (EMD) and Least Square Support Vector Regression (LSSVR) methods. Optimum parameters for LSSVR are carried out with the help of Particle Swarm Optimization (PSO) algorithm. The performance of the predictive model of the hybrid EMD-LSSVR method is then compared with ARIMA and LSSVR using several evaluation metrics, such as Mean Square Error (MSE), Root Mean Square Error (RMSE), Mean Absolute Error (MAE), and Mean Absolute Percentage Error (MAPE). The results show that the hybrid EMD-LSSVR method consistently produces better prediction accuracy than others for both USD/IDR and JPY/IDR data.

Keywords: Exchange rate, Empirical Mode Decomposition (EMD), Least Square Support Vector Regression (LSSVR), EMD-LSSVR.