

INTISARI

IMPLEMENTASI MODEL *HYBRID MAXIMAL OVERLAP DISCRETE* *WAVELET TRANSFORM* DAN *GATED RECURRENT UNIT* (MODWT-GRU) PADA PERAMALAN HARGA BITCOIN

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Transformasi digital telah membawa inovasi dalam sistem keuangan seperti *cryptocurrency*. Bitcoin dianggap sebagai aset keuangan spekulatif yang menyebabkan volatilitas harganya tinggi. Oleh karena itu, diperlukan metode peramalan yang mampu menangkap pola volatilitas dan fluktuasi harga Bitcoin secara akurat. Dalam penelitian ini, peramalan harga Bitcoin dilakukan dengan menerapkan metode *hybrid Maximal Overlap Discrete Wavelet Transform* (MODWT) dengan pemodelan runtun waktu ARIMA, LSTM, dan GRU. Metode MODWT digunakan untuk mendekomposisi data menjadi komponen *detail* dan *smooth*. Hasil penelitian menunjukkan bahwa model *hybrid* MODWT-GRU memberikan akurasi prediksi tertinggi dengan MAPE sebesar 1,48%, MAE sebesar 716,82, MSE sebesar 1,07E+06, dan RMSE sebesar 1036,24. Secara keseluruhan, penerapan transformasi wavelet MODWT terbukti meningkatkan akurasi model dalam peramalan harga Bitcoin. Dengan demikian, integrasi transformasi wavelet dapat menjadi pendekatan efektif untuk meningkatkan kualitas prediksi dalam analisis runtun waktu.

ABSTRACT

IMPLEMENTATION OF HYBRID MAXIMAL OVERLAP DISCRETE WAVELET TRANSFORM AND GATED RECURRENT UNIT (MODWT-GRU) MODEL ON BITCOIN PRICE FORECASTING

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Digital transformation has brought significant innovations to financial systems, particularly in cryptocurrency. Bitcoin is often regarded as a speculative financial asset, leading to high price volatility. Therefore, an accurate forecasting method is required to capture the patterns of Bitcoin's volatility and price fluctuations. This study forecasts Bitcoin prices by applying a hybrid method combining the Maximal Overlap Discrete Wavelet Transform (MODWT) with time series modeling techniques such as ARIMA, LSTM, and GRU. The MODWT method is used to decompose the data into detail and smooth components. The research results indicate that the hybrid MODWT-GRU model achieves the highest prediction accuracy, with a MAPE of 1.48%, MAE of 716.82, MSE of 1.07E+06, and RMSE of 1036.24. Overall, the implementation of the MODWT wavelet transform demonstrates its ability to enhance model accuracy in Bitcoin price forecasting. Thus, the integration of wavelet transformation can be an effective approach to improving prediction quality in time series analysis.