

ABSTRACT

Forecasting Ethereum prices presents a significant challenge due to its high volatility. As one of the largest cryptocurrencies, Ethereum exhibits complex and non-linear price movements, making it difficult to effectively capture using traditional models such as Autoregressive Integrated Moving Average (ARIMA). This study proposes a hybrid ARIMA and Gated Recurrent Unit (GRU) model to improve prediction accuracy by combining the strengths of both models. The GRU model was selected due to its simpler structure compared to Long Short-Term Memory (LSTM), as it only uses two types of gates (update gate and reset gate), making it computationally lighter while still being capable of capturing non-linear patterns and long-term dependencies in time series data.

This research uses daily closing price data for Ethereum from January 1, 2020, to December 31, 2024, sourced from Investing.com. The ARIMA model is used to identify linear patterns, while the residuals from the ARIMA predictions are further analyzed using GRU to capture non-linear patterns. The results show that the hybrid ARIMA(1,1,0)-GRU model yields better accuracy compared to the ARIMA(1,1,0) model alone. The Mean Absolute Percentage Error (MAPE) for ARIMA(1,1,0) is 22.42%, while the hybrid ARIMA(1,1,0)-GRU model shows a significant decrease with a MAPE of only 5.83%.

Keywords: *Forecasting, ARIMA, GRU, Hybrid Model, Cryptocurrency, Ethereum.*