Abstract

The increasing popularity of machine learning technology can be attributed to its notable versatility, which has allowed it to gain traction in several businesses and areas. The domain of cryptocurrencies represents a highly significant field wherein the influence of machine learning technology has been particularly noteworthy. In recent times, there has been a significant surge in the prevalence of cryptocurrencies, leading to a notable escalation in their market valuation. The recent increase in interest has garnered the attention of various investors, including both individual enthusiasts and prominent financial institutions and corporate entities. These investors have committed significant amounts of capital to actively engage in this rapidly growing business. Nevertheless, it is imperative to acknowledge the notable distinctions between the cryptocurrency market and conventional commodity markets. The phenomenon is distinguished by heightened degrees of volatility, pervasive uncertainty, and an increased level of unpredictability. Various elements, like as technological intricacies, market mood, and the dynamic legal environment surrounding cryptocurrencies, contribute to these attributes. In light of the inherent difficulties presented by the dynamic nature of this market, scholars have dedicated considerable resources towards the formulation of strategies aimed at effectively predicting the valuations of digital currencies. The fast pace and intrinsic intricacy of bitcoin markets render a considerable fraction of these prediction methods ill-suited for real-time execution. Given the aforementioned setting, the present study introduces an innovative hybrid model that incorporates machine learning and deep learning methodologies through the integration of Random Forest Regressor (RFR), Gaussian Regression Process (GRP), Recurrent Neural Networks (RNN) and Long Short-Term Memory (LSTM) networks. The main aim of this novel framework is to forecast the fluctuations in the prices of cryptocurrencies, notably Ethereum (ETH-USD), Bitcoin (BTC-USD), Cardano (ADA-USD), Bitcoin Cash (BCH-USD), Binance (BNB-USD), Dogecoin (DOGE-USD), Litecoin (LTC-USD), USD Coin (USDC-USD), Tether (USDT), and XRP (XRP). It is worth noting that the suggested model has undergone extensive training and validation using standardized datasets to demonstrate its proficiency in real-time situations. The empirical findings provide clear evidence that the model surpasses existing forecasting models in terms of its capacity to attain a high level of precision in predicting prices. As a result, it holds significant potential for investors and stakeholders who are navigating the unpredictable cryptocurrency market.