Enhancing Cryptocurrency Price Forecasting with a Multiple-Input Deep Neural Network Model

Abstract:

Cryptocurrencies have become widely recognised as an alternative exchange currency, presenting promising investment opportunities. However, the market's substantial volatility necessitates accurate forecasting models for effective portfolio management. This research proposes a Multiple-Input Cryptocurrency Deep Learning (MICDL) model, utilising data from Bitcoin (BTC), Ethereum (ETH), and Ripple (XRP) independently. The model aims to efficiently exploit mixed cryptocurrency data, reduce overfitting, and decrease computational costs. Empirical analysis spanning three consecutive years demonstrates the superior performance of MICDL in providing reliable price movement predictions compared to traditional deep learning models.

Related Work:

Prior studies have applied deep learning methodologies to cryptocurrency price forecasting, emphasising the complexity of the task. However, limitations exist, including inefficiencies in forecasting models. This research distinguishes itself by proposing a multiple-input neural network, exploring data from various cryptocurrencies for more accurate forecasts.

Multiple-Input Cryptocurrency Deep Learning Model:

The MICDL model employs a unique architecture, processing data from BTC, ETH, and XRP independently before merging and further processing for final predictions. This approach aims to extract valuable information from each cryptocurrency, effectively reducing overfitting and computational costs compared to traditional models. Daily historical data from January 2017 to October 2020 for BTC, ETH, and XRP were collected for evaluation. Transformations based on returns were applied to achieve stationarity, ensuring the suitability for training deep learning models.

Experiments:

Extensive experimental analysis evaluates MICDL against two CNN-LSTM models (Model1 and Model2). The evaluation includes regression performance metrics (MAE, RMSE, R²) and binary classification metrics (Acc, GM, Sen, Spe). MICDL consistently outperforms traditional models, showcasing its ability to provide accurate and reliable cryptocurrency price forecasts.

Conclusion:

The proposed MICDL model proves to be a valuable tool for cryptocurrency price forecasting, exhibiting superior performance in comparison to traditional models. This research contributes to the evolving field of cryptocurrency analysis, emphasising the importance of leveraging data from various cryptocurrencies for enhanced forecasting accuracy. Future research could explore additional enhancements to the MICDL model, incorporating evolving market dynamics and exploring the potential impact of external factors on cryptocurrency prices.