Cryptocurrency Price Prediction using Neural Networks and Deep Learning Techniques

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Abstract

- In terms of market value, cryptocurrency is extremely volatile, with a slew of unknowns that make it difficult to forecast and analyze future pricing. Because of their tremendous volatility, they have a huge profit potential if smart inventing tactics are used.
- This research proposes three recurrent neural network (RNN) algorithms for predicting the values of three different cryptocurrencies: Bitcoin (BTC), Litecoin (LTC), and Ethereum (ETH).
- The three models, namely gated recurrent unit (GRU), long shot-term memory (LSTM), and bidirectional LSTM (bi-LSTM) will be analyzed depending on the root mean squared error (RMSE).
- We will also be performing sentiment analysis on tweets along with Google trends data to achieve more accurate predictions.

Goal

- Providing a complete analysis of the many existing techniques for predicting the prices of Bitcoin, Ethereum, and Litecoin (BTC, ETH, and LTC).
- Using deep learning algorithms such as LSTM, bi-LSTM, and GRU to reliably anticipate cryptocurrency prices.
- Evaluating the proposed hybrid models for Bitcoin, Ethereum, and Litecoin utilizing evaluation matrices such as RMSE and mean absolute percentage error (MAPE).
- Performing sentiment analysis on tweets along with Google trends data to achieve more accurate predictions.

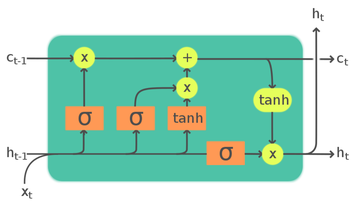

Figure 1. The structure of LSTM

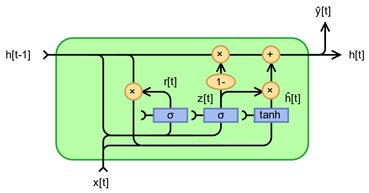

Figure 2. The structure of GRU

Methods and Materials

- Long short-term memory (LSTM), bidirectional LSTM (bi-LSTM), and gated recurrent unit (GRU) are three types of machine learning algorithms demonstrated in this research.
- The LSTM is an RNN-style architecture with gates that control information flow between cells. The input and forget gate structures can change information as it travels through the cell state, with the final output being a filtered version of the cell state dependent on the inputs' context.
- Bi-directional LSTM uses a finite sequence to forecast or tag the sequence of each element depending on the context of components in the past and future. Two LSTMs run in parallel, one from left to right and the other from right to left, to produce this result. Composite output is the forecast of a given target signal.
- The GRU is like a LSTM with a forget gate, but has fewer parameters than LSTM, as it lacks an output gate.
- The evaluation of the proposed schemes is done using the mean absolute percentage error (MAPE) and the root mean squared error (RMSE).
- We'll analyze tweets using natural language processing techniques and sentiment analysis to see how they affect the price and trading volume of cryptocurrencies.

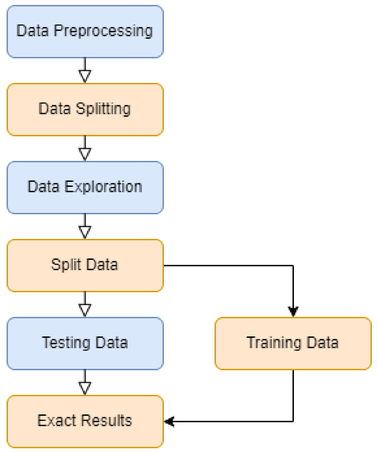

Figure 3. Flow of process

Significance

- A cryptocurrency user or trader will be able to make better informed cryptocurrency purchase and selling decisions by using the proposed prediction model.
- Since the paper will also utilize social media factors, mainly Twitter data, for predicting the price changes, can gain a purchasing or selling advantage by swiftly recognizing the impact of tweets on price direction.

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