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Forecasting of Cryptocurrency Values using Machine Learning

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Abstract: ***Bitcoin is a sort of cryptocurrency that has become a popular stock market investment. Many factors have an impact on the stock market. And bitcoin is a sort of cryptocurrency that has been slowly rising in recent years, with occasional severe declines that have had no discernible effect on the stock market. Because of the volatility, a prediction tool for bitcoin on the stock market is required. LSTM (Long Short-Term Memory) is a type of RNN module that was subsequently converted and used by numerous researchers, and it, like RNN, consists of recurrently consistent modules. The strategy and instruments we used to predict Bitcoin on the stock market yahoo finance can also be used to predict the price of cryptocurrencies. In the final section, we draw conclusions and discuss future work.***
Keywords: 1. LSTM., 2. Cryptocurrency., 3. Bitcoin., 4. Prediction., 5. Machine Learning.

I. INTRODUCTION

Because of imaginative breakthroughs, cryptocurrency has risen in appeal, acceptance, and controversy throughout the years. Cryptocurrencies are a type of digital currency that allows for online transactions. Unlike traditional currencies, cryptocurrency is built on encryption. Bitcoin is a type of cryptocurrency that is unregulated and decentralized.

Bitcoin's distinctive feature is its daily price changes, which fluctuate every day. On 28 June 2019, the value of Bitcoin Exchange Rate to (USD) was $ 12,354.73 USD in the yahoo finance stock market, and it fluctuates between growing and falling. In March, the value was $ 3900 USD. Many variables influence stock markets, including political and economic issues that have an impact on local and global levels. It is difficult work to interpret the key to success and to provide correct predictions. We can research the market using any technique, including technical indicators, price fluctuations, and market technical indicators.

To overcome the aforementioned issue, a prediction automation tool is needed to assist investors in determining whether or not to engage in the bitcoin or some other cryptocurrency markets. Automation systems are now widely used in stock market forecasting, and we may use the same methodology and strategy to forecast the bitcoin market. Another sort of RNN module is the LSTM (Long Short-Term Memory).Hochreiter & Schmidhuber (1997) invented LSTM, which was later developed and popularized by several researchers. The LSTM, like the RNN, is made up of recurrently consistent modules. From a number of articles and other sources, this study compiles information on cryptocurrency and share market predictions, approaches, tactics, and tools.

II. LITERATURE REVIEW

The authors evaluated the bitcoin market's short-term predictability using four different machine learning models on four distinct prediction horizons[1]. They discovered that all of the models they tested make statistically sound predictions. With accuracy ranging from 50.9 percent to 56.0 percent, their algorithms were able to forecast binary market behavior. Recurrent neural networks and gradient boosting classifiers were also proven to be suitable for prediction tasks[1].

They calculated the RMSE values of their two models and the model with the lowest RMSE is the best model. Their decision tree regressor had a lower RMSE value based on their findings. In addition, their research suggests that decision tree regressors are superior to LSTM when the data differences are minimal[2].

They investigated the best RNN implementation utilizing LSTM for real-time datasets and models. They used deep learning and applied it to a real-time problem of crypto-currency price prediction. They also included sentimental analysis from Twitter in their model, which resulted in an RMSE of 3.38[3].

They discovered that the direction of Bitcoin price in USD can be predicted with accuracy. They got their information from the Bitcoin Price Index[4]. They examined the LSTM and ARIMA models and found that the LSTM model has the highest classification accuracy (52%) and the lowest RMSE (8%). In time series forecasting, non-linear deep learning algorithms outperformed the ARIMA model[4].

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The authors proposed a model for predicting the price of the popular Bitcoin crypto currency using various neural network approaches such as Recurrent Neural Network and Long-Short Term Memory, as well as 10-fold cross validation[5]. The suggested model is compared to various current models in the same domain, including RNN with LSTM, Linear Regression, and Random Forest. The dataset used in this study was obtained from the coin market website, and live streaming data was used in the experiment[5].

Deep Neural Networks (DNNs) are a sophisticated artificial neural network, according to the authors describe the implementation and training of DNNs in this study[6]. They discovered that when trained concurrently across numerous markets on labelled data, DNNs show significant predictive skills as classifiers for a historical dataset of 5 minute mid-prices of different CME listed futures prices and other lags and filters[6]. They also show how to use DNNs to back-test a simple trading strategy, as well as the relationship between forecast accuracy and strategy profitability[6].

Deep neural network composition is used to forecast the Chinese stock indices in the study. The trend estimations are based on the projected indexes. The relative errors of projected and actual indices, as well as the accuracy of trend projections, are measured to assess prediction performance.[7]

III. METHODOLOGY

Another sort of RNN module is the LSTM. Hochreiter & Schmidhuber (1997) invented LSTM, later on it was popularized and developed by several researchers. The LSTM network is made up of recurrently consistent modules, just as the RNN.

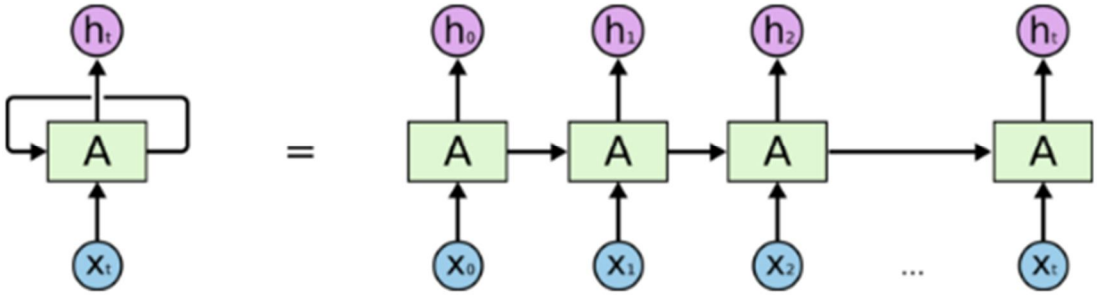


Figure 1: Unrolled Structure of RNN

The distinction between LSTM and RNN is the connectivity within the hidden layers of the RNN. Figure 1 depicts the RNN explanation structure. The memory cell of the structural buried layer is the only difference between RNN and LSTM. The gradient difficulties are efficiently solved by the construction of three unique gates[8]. Figure 2 shows the hidden layer's LSTM memory structure.

Figure 1 shows how RNNs have flaws. The flaws can be seen in the input Xo, X1, which has a very wide range of information Xt,, Xt+1, As established by Bengio et al., when 1+1 requires information, those who are vital Xo, X1 to RNNs are still unable to learn to connect information since old memory kept will become increasingly worthless as time passes due to overwriting or replacement with fresh memory.

Unlike RNNs, LSTMs do not have the disadvantage of being unable to manage memory at each input through the use of memory cells and gate units.

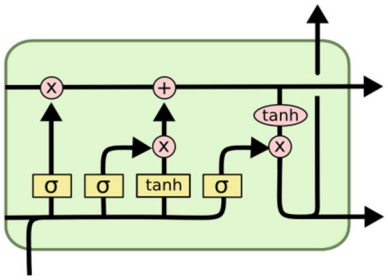


Figure 2: LSTM Memory Cell Structure

- i(t) = input gate, which indicates that information in the cell will be updated; • f(t) = forget gate, which indicates that information should be removed from the cell [10].
- O(t) is the output gate, which indicates how much data is output.
- c(t) = the candidate value for the memory cell's states at time t.
- c(t) = the state of the current memory cell at time t, determined using element-wise multiapplication and a combination of i(t) and c(t) and f(t) and c(t -1).
- h(t) = the average output value after filtering by the output gate [9].
- = indicates a sigmoid function with a range of 0 to 1, which is used to place a value between -1 and 1.

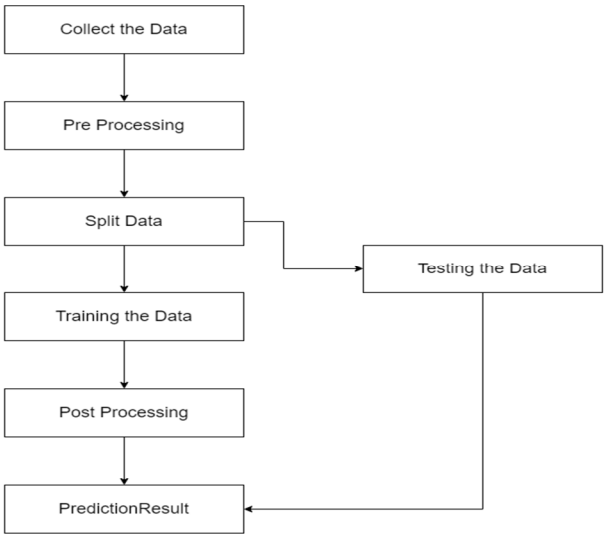


Figure 3: Prediction Model

According to Figure 3, The method begins with gathering data, which is obtained through the stock market on Yahoo Finance which is based on the USD exchange rate. The timeframe of the dataset is from 01-01-2010 to 31-12-2020.

IV. EXPERIMENTAL RESULT & ANALYSIS

Figure 4 depicts the pre-processing results for putting the dataset into the system and algorithm, followed by bitcoin's last day close price data before training, testing, and forecasting the results.

We separated the data into 70% training and 30% testing for Step Split and training. We cannot use random splitting to divide the data into train and test since the time component would be lost. As a result, we used the data from the last three years to test the dataset, while the data from the previous seven years was used to train it.

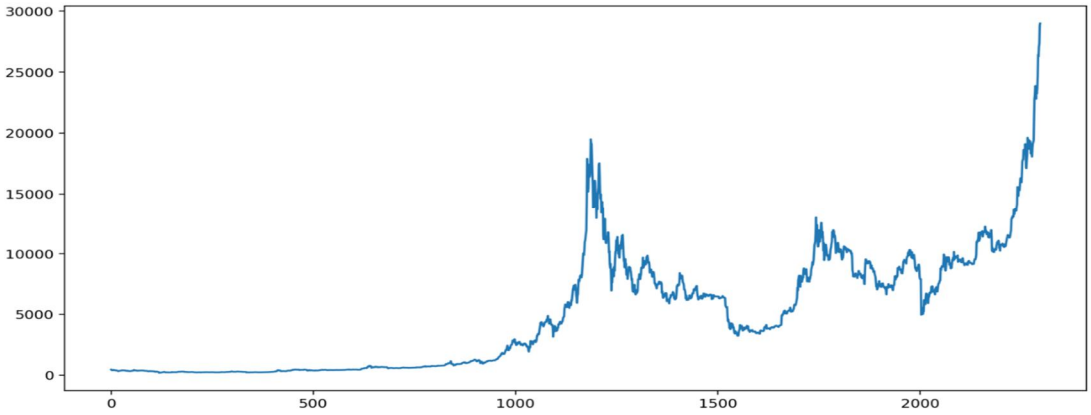


Figure 4: Close Price Bitcoin

Figure 5 shows the results of LSTM prediction as a graphs with 100 epochs, model dropout 0.5, and the Green Line representing the close prediction.

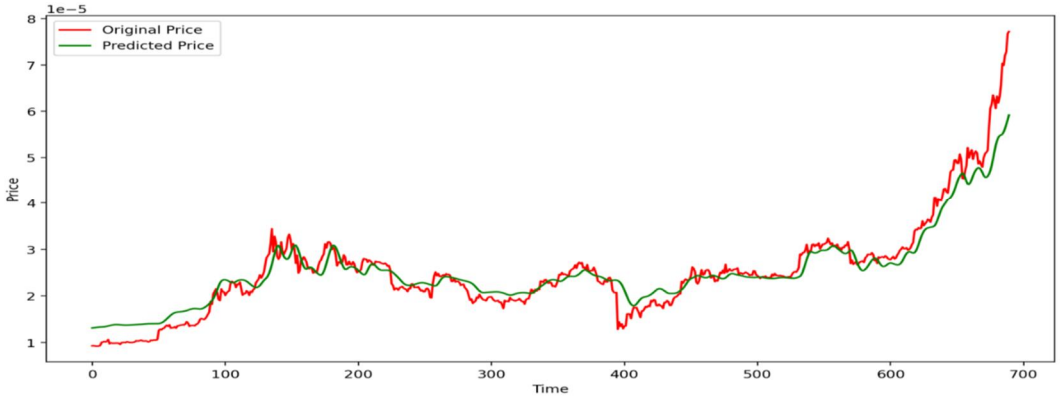


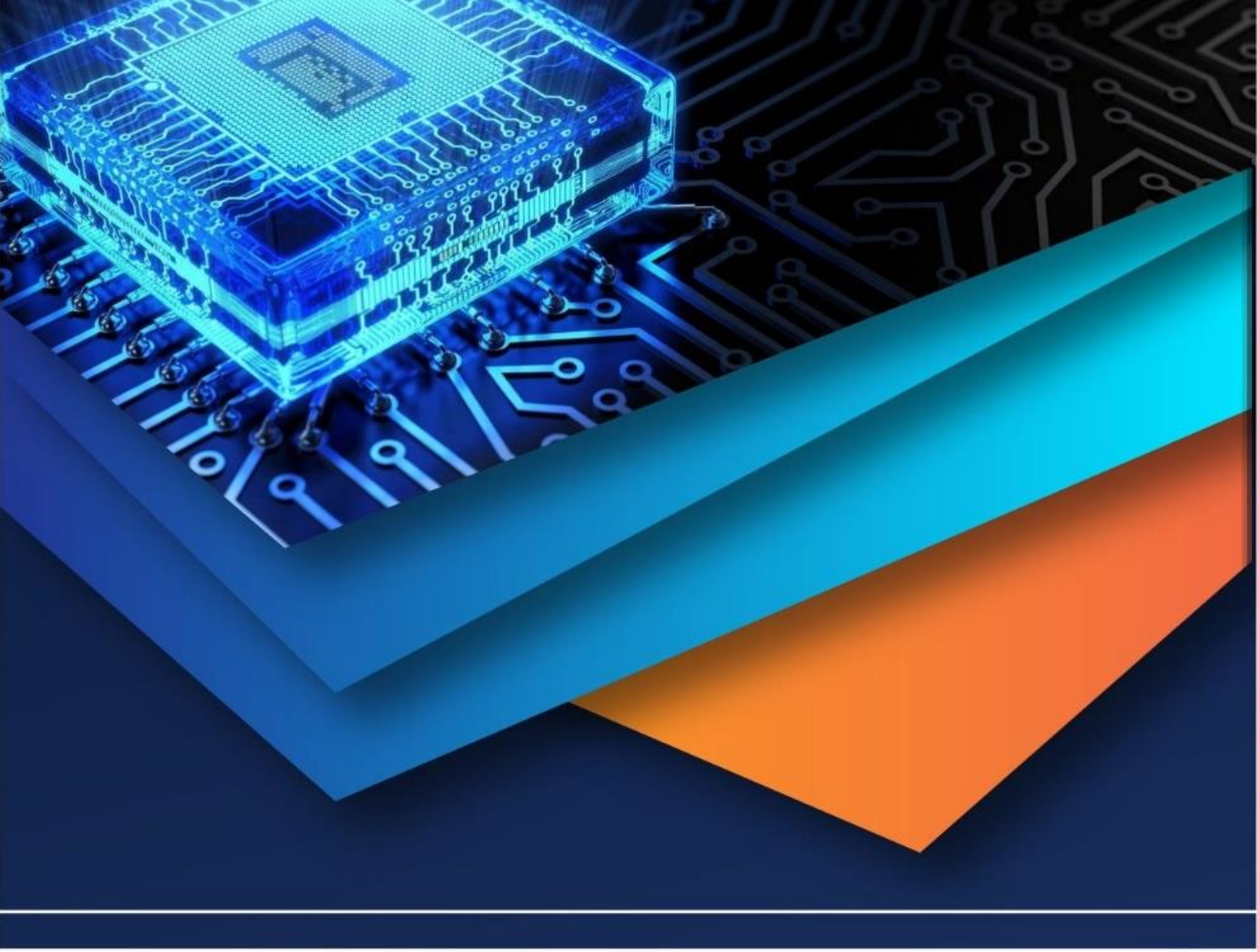
Figure 5: Prediction Result of Bitcoin

V. CONCLUSION

Our proposed methodology was successful in predicting bitcoin prices using the Yahoo Finance stock market. With the data to train and test mentioned in the research, our model using time series approaches may construct and deliver results, as well as anticipate price and stock market movements for cryptocurrencies. Following that, as previously stated in the study, a range of uncertainty variables influence the stock market. Stock markets are influenced by a range of factors, including local and worldwide political and economic crises. So, using LSTM to forecast bitcoin price isn't enough to decide whether or not to invest in bitcoin; it's only one part of the puzzle. Future research will look into changed LSTM layers, dropout, and adjusted number of iterations, along with using different volatility datasets to see how well the prediction findings hold up, or merging sentiment analysis with the LSTM method to determine the effects of bitcoin price uncertainty.

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