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Bitcoin Price Prediction Using Machine Learning Models

Abhijeet Kumar, M Esha, Rudra Raman, Vijayakumara Y M

B.E Students, Dept. of Information Science and Engineering, Sir M Visvesvaraya Institute of Technology, Bangalore, Karnataka, India

Associate Professor, Dept. of Information Science and Engineering, Sir M Visvesvaraya Institute of Technology, Bangalore, Karnataka, India

ABSTRACT: After the boom and of cryptocurrencies' prices in recent years, Bitcoin has been increasingly regarded as an investment asset. Because of its highly volatile nature, there is a need for good predictions on which to base the investment decisions. Although existing studies have imposed machine learning for more accurate Bitcoin price prediction, few have focused on the viability of applying different modeling techniques to samples with different data structures and dimensional features. To predict Bitcoin price at different frequencies using machine learning techniques, we first classify Bitcoin price by daily price and high-frequency price, to capture the underlying information for the study.We then perform a linear regression model to predict the Bitcoin prices at all frequencies.

KEYWORDS: Bitcoin, Blockchain, Deep Learning.

I. INTRODUCTION

Bitcoin is a type of digital currency that is commonly used for investment purposes. Unlike other currencies, it is not owned by anyone and its transactions are easy to make. It can be bought and sold through various marketplaces such as bitcoin exchanges. These allow people to buy and sell bitcoins without having to go through a country's multiple banks and other financial institutions.The data that is collected during a transaction is stored in a blockchain, which is a secure and encrypted database. Each block of data contains a unique reference to a previous block. The users' name and wallet ID are not revealed during the transactions.

II. PROBLEM STATEMENT

The goal of this project is to develop an artificial intelligence system that can predict the future prices of bitcoin. This will allow investors to make informed decisions regarding the cryptocurrency. Since the prices of bitcoin have gone up significantly in the last ten years, this system can be very useful for those who are looking to invest in the market.

III. METHODOLOGY

A selection of models were then tested to predict the direction of the Bitcoin price movement. Some of these included the Support Vector Machine, Autoregressive integrated logistic model, and the regression algorithm.

The models were then tested using a Recurrent neural network. The goal of the project was to analyze how the various models performed on the task. The main objective of the study was to find out how the assumptions underlying the models could affect their performance.

A. Logistic Regression

It is a statistical method for examine adataset in which there are one or more individualistic variables that determine an outcome. The outcome ismeasured with a divided variable (only two possible outcomes). It is used to predict a binary outcome (1 /0, Yes / No, True / False) given a set of independent variable.It is a predictive regression model in whichthe dependent variable is categorical. It uses Maximum Likelihood Estimation to formulate theprobabilities in which Logistic Regression will take on a particular class.

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B. Support Vector Machine

Like logistic regression, the support vector machine algorithm yields a binary classificatiomodel while making very few assumptions about the dataset. The classifier is obtained by optimizing: where x is the input and w,b are parameters that must be learned. Predictions are made by analyzing the value of wTx + b.

C. Auto Regressive Integrated MovingAverage(Arima)

ARIMA is a model used for time seriesanalysis and forecasting. The model is used on time series data which will be transformed into astationary time series; the predictions are a linear regression upon features including time differencesand moving averages. The implementation used is from the Statsmodels package (Seabold and Perktold,2010). In ARIMA, the data is difference that is, the price features are transformed to the difference between prices.

D. Recurrent Neural Networks(Rnn)

The RNN isstructured similarly to the MLP(multi layer perceptron), with the exception that signals can flowboth forward and backwards in an iterative manner.In order to facilitate both the backward and forwardflow an addition layer has been added called the Context Layer .In addition to passing input betweenlayers, the output of each layer is fed to the context layer to be fed into the next layer with the next input.

In this context, the state is overwritten at eachtimestep. This offers the benefit of allowing the network to assign particular weights to events thatoccur in a series rather than the same weights to all input as with the MLP.

We used Long short-termmemory(LSTM)cells. We tried different numbers of units for the layers, training times, and batch sizes.

We have implemented the neural networks with bothKeras and TensorFlow

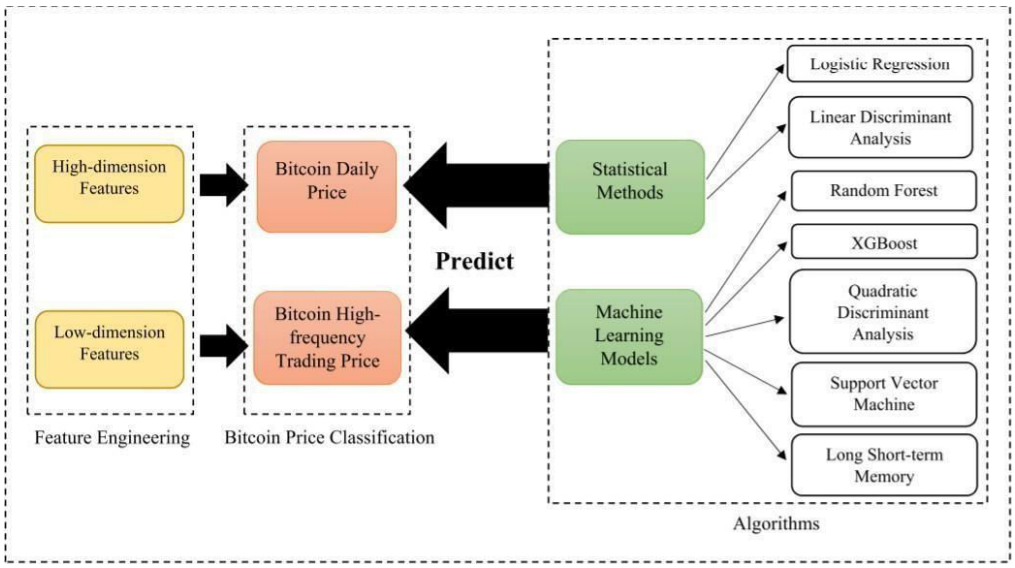

Figure 1 : System Architecture

IV. ALGORITHM

This section covers the various techniques used in the development of Bitcoin prediction. For instance, we use two statistical methods to predict the daily price of bitcoin. One of these is the linear discriminant analysis, while the other is the logistic regression. We also use multiple machine learning models such as the XGBoost, the LSTM, and the support vector machine.

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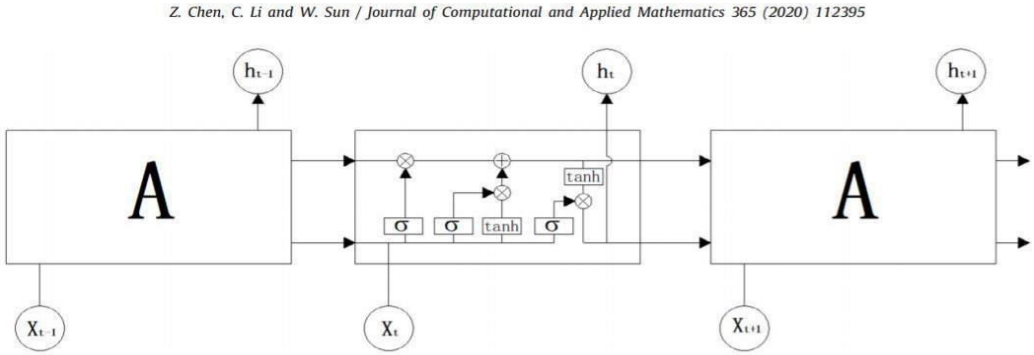

Figure 2. Long Short - Term Memory

V. CONCLUSION

The use of deep learning models such as the LSTM and RNN for Bitcoin prediction is promising, as they can recognize long-term dependencies. However, due to their high variance task, it is not easy to achieve impressive validation results. One of the most important factors that can prevent a model from learning sufficiently is overfitting. This issue can be solved by implementing a strategy known as Bayesian optimization, but it still cannot guarantee good results. Despite the various metrics that are used to measure the performance of deep learning models, the results of the ARIMA forecast were significantly worse than those of neural network models.

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