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PREDICTING CRYPTOCURRENCY PRICES USING MACHINE LEARNING TECHNIQUES

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ABSTRACT: The goal of this study is to improve price forecasts by comprehending the several market factors that affect the daily fluctuations in the value of Bitcoin. The main goals of the first stage are to track the price of Bitcoin over time and identify the variables that affect it. By examining daily data on Bitcoin's price and payment network properties, researchers hope to identify trends that improve valuation algorithms. Improving the accuracy of daily predictions of Bitcoin price variations will be the focus of the next round of the research. The study's overarching goal is to improve traders' and investors' prediction methods by incorporating market insights and historical data. The major goal of this project is to make the Bitcoin ecosystem's decision-making process easier and to explain why Bitcoin is so unpredictable.

Keywords: *Lasso Algorithm, Decision Tree, Linear Regression, MSE, RMSE, MAE, RSQUARED.*

1.INTRODUCTION

The goal of Bitcoin Prediction is to compare multiple machine learning techniques in order to determine which ones produce the best accurate predictions of future Bitcoin prices.

By combining feature selection and machine learning methods, this study intends to predict future bitcoin prices. The goal is to create forecast models that take volatility and feature series into consideration by converting order book data into time-based characteristics, also called feature series.

Trading tactics, investment decisions, option valuation, and evaluations of systemic risk are all profoundly affected by volatility, which is a measure of price swings. As a measure of price variations, volatility can be thought of as a metric of uncertainty. At its current price point, Bitcoin is the most valuable cryptocurrency. It is also a key part of the ongoing financial revolution that blockchain technology is driving.

Using this knowledge to predict how bitcoin's price will change is an enticing prospect for data mining and machine learning students.

An rising number of people are using Bitcoin, a digital currency, to make purchases and send money online. Because Bitcoin is decentralized, it is difficult to pinpoint a single person or organization as the cryptocurrency's creator.

Because they are not loyal to any one country, doing business with them is quick and easy. There are a lot of websites that will take bitcoin as payment. Businesses that operate in this manner are called "bitcoin exchanges." Their services make it easy to exchange Bitcoin for a variety of other currencies.

Mt. Gox is widely considered to be the best Bitcoin exchange by the general public. A digital wallet is like an internet bank account; it stores Bitcoins. Blockchain is a decentralized database that keeps track of the timestamps of transactions. The purpose of each block in a blockchain is to record the addition of a new entry to the chain. It is possible to link one data block to the one before it.

The term "blockchain" describes a distributed ledger that stores encrypted data.

Wallet identifiers are the only publicly available information during transactions; users' real names are hidden. The revolutionary digital money known as Bitcoin, or BTC for short, functions autonomously from any central authority. All of the financial transactions are handled by a distributed network of individuals who are all linked together online.

When a Bitcoin transaction is finalized, users notify the rest of the network. After network nodes verify a transaction, the public distributed ledger known as the blockchain records the transaction. The market capitalization of Bitcoin is far higher than that of any other cryptocurrency.

To reward participants for their computational power, these coins are given out in a competition to verify and record blockchain transactions.

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Improving the blockchain's general security is one of the main goals of the competition. You can buy and sell goods and services with Bitcoins, and you can even turn them into fiat money.

An exchange office is a good place to swap Bitcoins for other currencies. This information is contained in an order book in the form of "buy" and "sell" orders. If you want to buy a certain amount of Bitcoins for a certain price, you can use the "buy" or "bid" buttons. That they are vying for the same quantity of Bitcoins as other purchasers is another possible interpretation. In Bitcoin offers, terms like "sell" or "ask" indicate that the person making the offer plans to sell a certain amount of Bitcoins for a certain price. A buyer-seller transaction is successfully completed when the order book matches orders based on price.

2. LITERATURE SURVEY

P. Ciaian, M. Rajcaniova, and D. Kancs, Appl.Econ., vol. 48, no. 19, pp. 1799–1815, 2016

No study of this kind has looked at how much Bitcoin is worth. To do this, we look at demand and supply in the market as a whole, as well as elements unique to bitcoin and its function as a digital currency, like the opinions of investors and consumers.

Using the guidelines laid out in Barro's model (1979), we can test theories. Our attempts are grounded in this cognitive approach.

Our time-series analysis of daily data from 2009–2015 shows that the current state of the market and the attractiveness of Bitcoin to buyers and consumers have a substantial impact on the price of the cryptocurrency. This was done to prove our point. The extent to which this influence changes over time, though, and that must be recognized.

Our results contradict those of earlier research that predicted macroeconomic factors would have an impact on Bitcoin's long-term price.

S. McNally, Ph.D. dissertation, School Comput.,Nat. College Ireland, Dublin, Ireland, 2016.

Predicting the direction of bitcoin's price in US dollars is examined in this article along with its accuracy and reliability. Get price statistics for Bitcoin by using the Bitcoin Pricing Index. A combination of a long short-term memory (LSTM) network and a recurrent neural network (RNN) tuned for Bayesian statistics is used to solve the problem. Results from comparing the two networks' abilities to complete the task are contradictory.

With a 52% classification rate and an RMSE of 8%, the LSTM model has the best performance. These two numbers seem to be performing much better than the others. Instead of using deep learning to generate time series forecasts, you can use the well-known ARIMA model.

Compared to the unvalidated ARIMA prediction, non-linear deep learning systems naturally do better. Lastly, the two deep learning models' performance is demonstrated using a graphics processing unit (GPU) and a central processing unit (CPU). Compared to the CPU implementation, the GPU implementation's training phase is 67.7 percent longer.

Madan, S. Saluja, and A. Zhao, Dept. Comput.Sci., Stanford Univ., Stanford, CA, USA, Tech. Rep., 2015

The goal of this machine learning research is to foretell how much one bitcoin will cost in the future. Finding and categorizing the different patterns that show up in the Bitcoin market every day was once a major goal. Another one of our goals was to figure out what would make bitcoin worth the most under certain circumstances.

More than twenty-five separate parts make up the dataset, which examines Bitcoin and its payment network from different angles. During the five years of the trial, all parameters were recorded daily. Using this data, we attempted to predict daily price swings and achieved a 98.7 percent success rate. After that, we narrowed our focus to information about Bitcoin's price. Each ten minutes and every ten seconds, we retrieved fresh data. That way, we could examine estimations of prices with different degrees of precision and unpredictability.

Making reliable predictions about impending price changes is the goal of framing the problem of future price forecasting as a binomial classification issue. An technique that combines random forests and generalized linear models is what we use to tackle this difficulty. According to the results, when utilizing 10-minute intervals, the researchers were half-right about predicting future price increases.

P. Katsiampa, Econ. Lett., vol. 158, pp. 3–6, Sep. 2017

Finding the best conditional heteroskedasticity model to use while evaluating Bitcoin price data was the primary goal of this study. The importance of including both short-term and long-term conditional variation in the ideal model is highlighted by this discovery.

At the end of the study, you may find a collection of the sources that were studied here.

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3. METHODOLOGY

System Architecture

The bitcoin data used in this analysis was supplied by Quandl. Training and testing are done on the data first. Decision trees, linear regression, and the Lasso algorithm are the three separate approaches used to arrange the dataset.

Comparing the outcomes of three separate algorithms verifies the accuracy of each approach. Analyzing the outcomes reveals the precise expense.

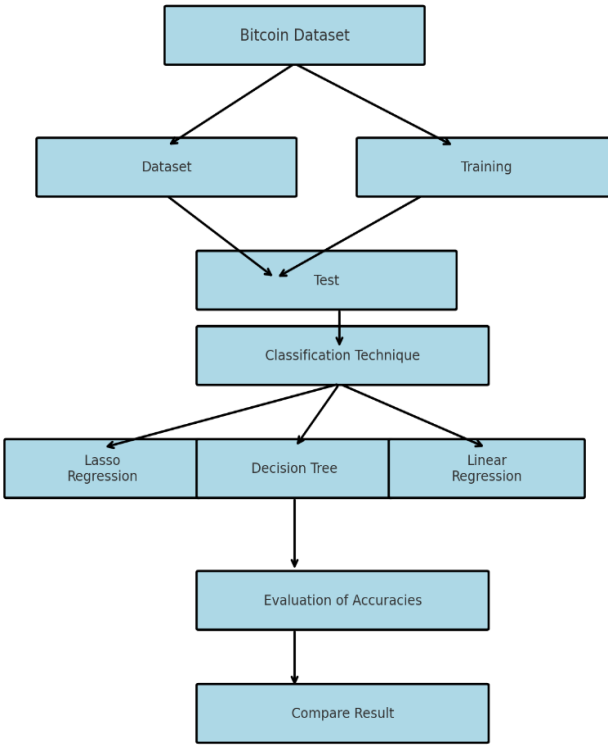

Fig 1. the planning and construction of the facilities

Machine Learning Classifiers

The assumption of linearity between x and y in linear regression means that a single independent variable is sufficient for this type of analysis.

$$minimize \frac{1}{n}\sum_{i=1}^{n}(pred_i - y_i)^2$$

$$J = \frac{1}{n}\sum_{i=1}^{n}(pred_i - y_i)^2$$

A regression analysis method that enhances the predictability and interpretability of the final statistical model is the Lasso, which stands for least absolute shrinkage and selection operator (LASSO). The combination of regularization with variable selection makes this possible.

With the use of software, a decision tree may sort datasets into subsets according to a number of predetermined criteria. This kind of instruction is widely used and has shown to be quite beneficial.

For problems involving classification and regression, decision trees are indispensable. They are an example of an unbounded directed learning modality.

4. RESULTS AND DISCUSSION

The test set generated a figure throughout the evaluation trial. The research is conducted using the Python software platform. The testing station has a 2.4GHz Intel Core laptop CPU and 3GB of RAM. It is common practice to use machine learning to assess the suggested methodology. According to the experimental outcome

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modeling, this approach is unable to handle the Bitcoin dataset's diversified photo collection.

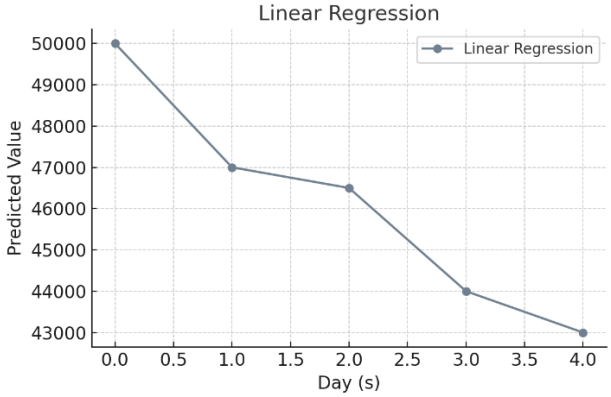

Fig 2. Costs are predicted using linear regression.

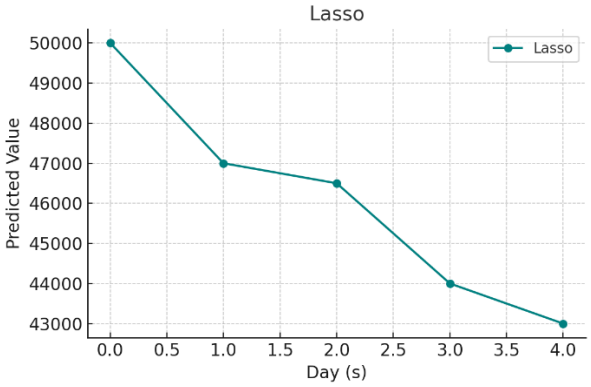

Fig 3. How to Predict Prices Using Lasso Regression

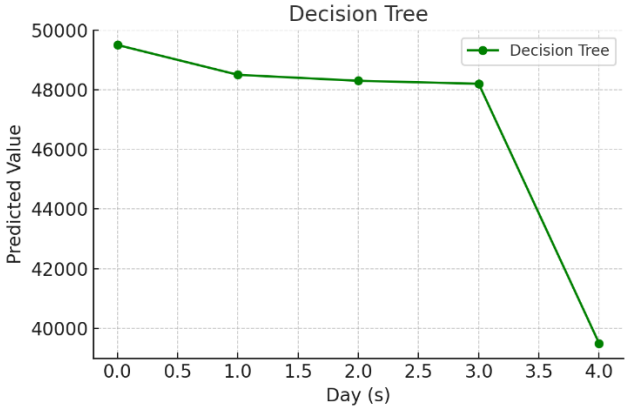

Fig 4. A decision tree can be used to calculate prices.

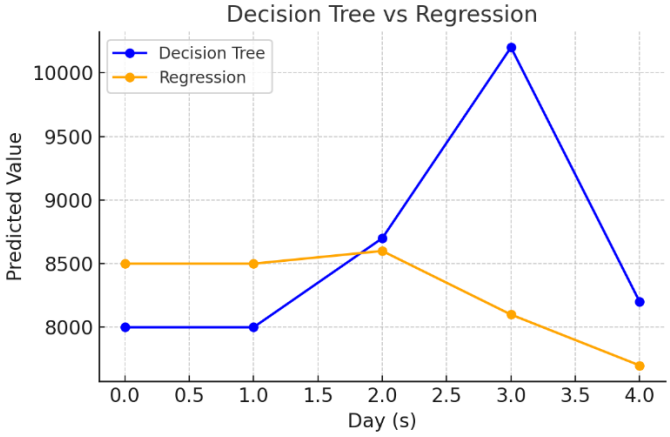

Fig 5. Comparison of Linear Regression versus Decision Trees

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Table 1

Metric	Lasso	Regression
MSE	126154.7505	105644.6069
MAE	137.1256	130.8279
R-Squared	0.9991	0.9993
RMSE	355.1827	325.0301
Accuracy	99.9176	99.9310

Table 2

Metric	Decision Tree	Linear Regression
Accuracy	**98.3895**	**99.0558**

The Bitcoin dataset is used to make forecasts using the Lasso and Regression algorithms. There are a number of metrics presented in Table 1 that pertain to the accuracy, MSE, MAE, R-squared, and RMSE of the predictions. The second table displays the accuracy of the predictions produced by the Decision Tree and Regression algorithms for the Bitcoin dataset.

5. CONCLUSION

The unpredictability of Bitcoin makes decentralized, secure data gathering and model changes for forecasting imperative. To improve accuracy, researchers use decentralized immutable ledgers and separate witnesses. While linear regression shows a little better accuracy of 98.7%, Lasso regression only manages 98.6%. The accuracy of linear regression in predicting future price movements is somewhat higher than that of decision trees (97.7% vs. 97.5%). But models can't stay dependable without regular updates. As a result of improvements in data collecting and update procedures, analysts help traders make better decisions and provide more accurate predictions of Bitcoin prices.

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