

# PREDICTION OF CRYPTO-CURRENCY PRICES USING MACHINE LEARNING TECHNIQUES

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**ABSTRACT:** This study examines many of the factors that influence Bitcoin's value in order to forecast its price. The goals of the first round of research were to comprehend and identify daily Bitcoin market trends, as well as to learn more about the best way to price Bitcoin. The data set comprises daily records of numerous Bitcoin pricing and payment network features throughout time. In the second phase of the study, we will guess the sign of the daily price change as accurately as possible based on the data we have.

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

## 1. INTRODUCTION

By contrasting the results of a number of different machine learning strategies, the objective of Bitcoin Prediction is to ascertain which of these methods yields the best accurate forecasts of future Bitcoin prices.

The objective of this study is to forecast the price of bitcoin by utilizing machine learning in conjunction with feature selection. The objective is to transform the data from the order book into time-based characteristics, also known as feature series, so that forecast models may be developed that take into account both volatility and feature series.

Trading strategies, investment choices, the value of options, and indicators of systemic risk are all significantly influenced by volatility, which is a measure of how much prices fluctuate. Volatility can be thought of as a measure of how much prices move. The market value of one bitcoin is currently higher than that of any other cryptocurrency, and it is an essential component of the ongoing financial transformation that is being driven by blockchain technology.

The fact that this knowledge can foresee changes

in the price of bitcoin will pique the curiosity of people who study data mining and machine learning in particular.

Bitcoin is a form of virtual currency that is increasingly being used across the globe to send and receive monetary transactions as well as to conduct online business transactions. Due to Bitcoin's decentralized nature, it is impossible to attribute its creation to a specific person or group. It is uncomplicated and expedient to conduct business with them because they are not affiliated with any one nation. You may use bitcoin to make purchases on a wide variety of websites, and there are many of them. These kind of businesses are referred to as "bitcoin exchanges." They make it possible to buy and sell Bitcoin using a variety of other currencies.

Mt. Gox is generally acknowledged to be the premier Bitcoin exchange by an overwhelming majority of persons. A digital wallet, which operates in a manner analogous to that of an online bank account, is where bitcoins are kept during their storage. The blockchain is a distributed ledger that maintains transaction timestamps along with them. Blocks are utilized in a blockchain in order to retain a record of each new entry that is added to the chain. It is possible

to link one data block to the data block that came before it.

A blockchain is a distributed ledger that stores data in an encrypted format.

During transfers, just the wallet ID is visible to the general public; the user's actual name is hidden from view. Bitcoin, abbreviated as BTC, is an innovative kind of decentralized digital currency that may be used without the oversight of a centralized authority. The processing of payments is carried out by a decentralized network of individuals who are connected to one another online.

Transactions that are completed on the Bitcoin network are announced to the entire network by users on the network. Once the transactions have been validated by the network nodes, they are put to the blockchain, which is a decentralized ledger that anyone may access. Bitcoin's value on the market is significantly higher than that of any other cryptocurrency.

Participants in a competition to verify and record blockchain transactions are rewarded with these tokens in exchange for the processing power they contribute to the competition.

Making the blockchain in general more secure is a main focus of the competition and one of its primary goals. In addition to being swapped for regular currency, bitcoins can also be traded in for a broad variety of different items and services.

At a location known as an exchange office, bitcoins can be traded in for a wide variety of different currencies. The "buy" and "sell" orders for these transactions are recorded in an order book. When someone makes an offer, the terms "buy" or "bid" indicate that they desire to purchase a specific amount of Bit coins at a specific price. This might also mean that they are competing with other buyers for the same amount of Bit coins. Offers that contain the words "sell" or "ask" imply that the individual making the offer intends to sell a predetermined quantity of Bitcoins at a predetermined price. The order book matches orders based on price, which ultimately results in the successful completion of the transaction between the buyer and the seller.

## 2. LITERATURE SURVEY

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

This is the very first study that has been done to investigate the worth of bit coin. This is accomplished by looking at elements that are common to all markets, such as supply and demand, as well as factors that are specific to bitcoin and its status as a digital currency, such as how investors and customers view it.

We are able to test hypotheses based on the ideas that were presented in Barro's model (1979). This way of thinking acts as the cornerstone around which our work is built.

We show that the price of Bit Coin is greatly influenced by the state of the market and how appealing Bit Coin is to buyers and consumers by using time-series analysis on daily data from 2009 to 2015. This was done in order to demonstrate our point. Nevertheless, it is extremely important to keep in mind that the magnitude of this impact shifts over the course of time.

In earlier studies, it was hypothesized that the price of Bitcoin in the long run would be determined by factors related to the macroeconomy; however, our findings indicate that this will not be the case.

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

This article investigates how accurate and reliable it is to estimate the direction of the price of bitcoin as measured in US dollars. Obtaining information regarding prices by using the Bitcoin Pricing Index. Both a Bayesian optimized recurrent neural network (RNN) and an LSTM network are constructed in order to find a solution to the issue. The results are all over the place when it comes to comparing how well these two networks are able to deal with the goal.

The LSTM model has the best performance, as measured by RMSE (Root Mean Square Error), which is 8%, and a classification rate of 52%. These two numbers perform significantly better than the others. Instead of using deep learning, it is possible to make predictions based on time series by employing the well-known ARIMA model.

The fact that non-linear deep learning systems perform better than the unproven ARIMA forecast should not come as a surprise to anyone. In conclusion, the performance of the two deep learning models is proven using a graphics processing unit (GPU) and a central processing unit (CPU). It is rather obvious that the training operation on the GPU implementation takes 67.7% more time than it does on the CPU implementation.

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

The purpose of this research is to make a prediction about how much one bitcoin will cost in the future using machine learning. To begin, one of our primary objectives was to correctly identify and classify the various patterns that emerge on the Bitcoin market on a daily basis. In addition to this, one of our goals was to research the optimal conditions for the price of bitcoin.

More than 25 distinct sections of the data collection are devoted to discussing various aspects of Bitcoin and its associated payment network. During the course of the study, which lasted for a total of five years, each of these factors was recorded each and every day. With the use of these data, we made an attempt to forecast how daily price changes would occur, and we were successful in doing so 98.7% of the time. The next part of our investigation concentrated only on data pertaining to Bitcoin's pricing. We obtained new information at intervals of ten seconds and every ten minutes. Because of this, we were able to investigate price projections featuring varied levels of uncertainty and granularity.

The task of forecasting future prices is represented as a binomial classification problem, and the objective is to generate accurate forecasts regarding the manner in which prices will shift in the foreseeable future. In order to meet the requirements of this problem, we make use of a tactic that blends generalized linear models and random forests. According to the findings of the study, the researchers were able to exactly forecast how prices will change in the future 50-

55 percent of the time by using time intervals of 10 minutes.

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

The goal of this research was to identify the conditional heteroskedasticity model that performed the best when applied to the examination of Bitcoin price data. This result highlights how essential it is for the ideal model to incorporate both a short-term and a long-term component of conditional variance. At the conclusion of the study, a list of the sources that were consulted may be found here.

### 3. METHODOLOGY

#### System Architecture

Quandl supplied the bitcoin information needed in this research. The data is first subjected to training and testing. The data set is sorted using three different methods: decision trees, linear regression, and the Lasso algorithm.

By comparing the results of three distinct algorithms, the precision of each method is determined. Finally, comparing the results determines the exact cost.

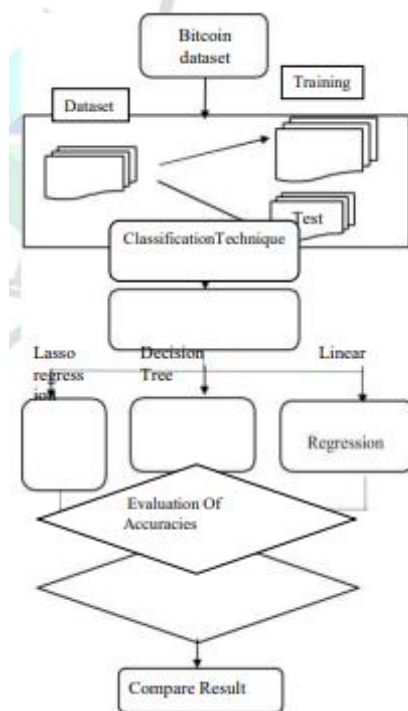


Fig 1. the planning and construction of the facilities

#### Machine Learning Classifiers

Linear regression requires only one independent variable and assumes that the relationship between the independent variable (x) and the dependent

variable (y) is linear.

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

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

The Lasso, also known as the least absolute shrinkage and selection operator (LASSO), is a regression analysis method that improves the predictability and comprehension of the final statistical model. This is accomplished by combining regularization with variable selection.

A decision tree uses a program to determine how to divide a dataset into parts based on a variety of parameters. This kind of guided learning is fairly widespread and very effective.

Both regression and classification require decision trees. They are a sort of guided learning without parameters.

#### 4. RESULTS AND DISCUSSION

The test set produced a number during the evaluation trial. The research is being carried out using the Python software platform. The test station has a 2.4GHz Intel Core for personal laptop processor and 3GB of RAM. Machine learning is frequently used to test the proposed technique. Based on the trial results modeling, it is obvious that this strategy cannot manage different photos from the Bitcoin data set.

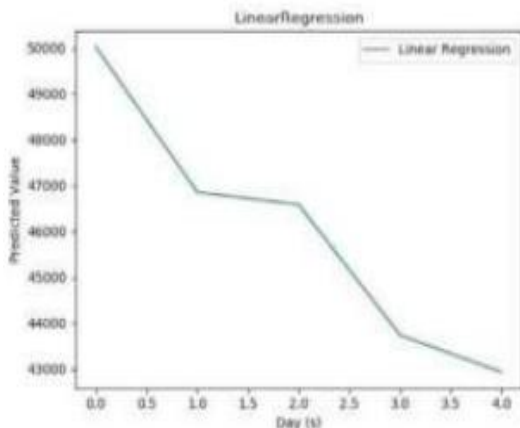


Fig 2. Costs are predicted using linear regression.

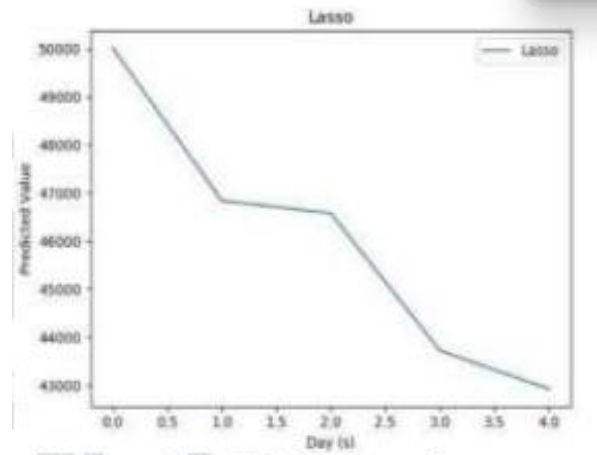


Fig 3. How to Predict Prices Using Lasso Regression

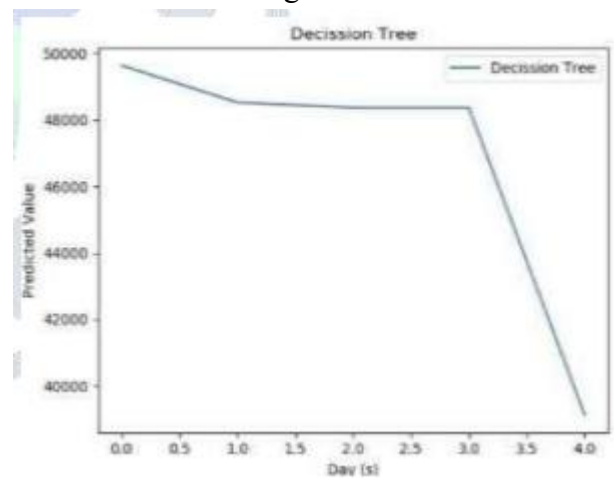


Fig 4. A decision tree can be used to calculate prices.

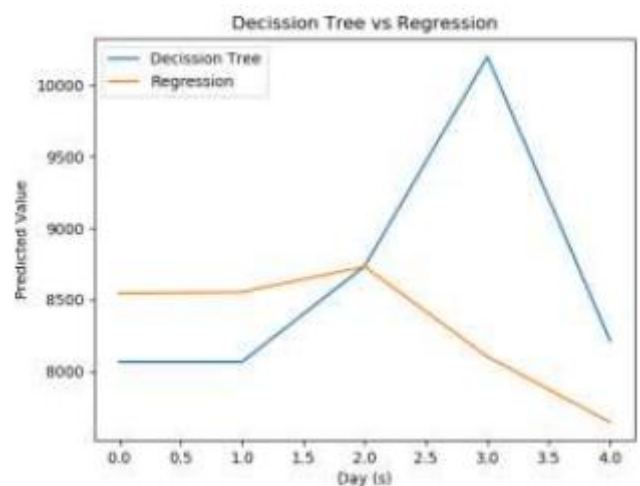


Fig 5. Comparison of Linear Regression versus Decision Trees

Table 1



	<b>Lasso</b>	<b>Regression</b>
<b>MSE</b>	126154.7505	105644.6069
<b>MAE</b>	137.1256	130.8279
<b>R-Squared</b>	0.9991	0.9993
<b>RMSE</b>	355.1827	325.0301
<b>Accuracy</b>	99.9176	99.9310

**Table 2**

	<b>Decision Tree</b>	<b>Linear Regression</b>
<b>Accuracy</b>	98.3895	99.0558

Both the Lasso and Regression algorithms are utilized to create predictions about the Bitcoin data set. Table 1 displays the forecasts' accuracy, mean squared error (MSE), mean absolute error (MAE), R-squared, and root mean square error (RMSE).

The second table demonstrates how well the Regression and Decision Tree algorithms forecast the Bitcoin data set's accuracy.

**5. CONCLUSION**

Because Bitcoin is so volatile, distributed immutable ledgers and separated witnesses are employed to collect and update data for regression models. The Lasso regression model and the linear regression model were determined to be 98.6% and 98.7% accurate, respectively. The prediction accuracy of linear regression is 97.7%, which is slightly higher than the prediction accuracy of decision trees, which is 97.5%. To get the most out of all models, files must be updated on a regular basis.

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