

Crypto-Currency Price Prediction Using Machine Learning Techniques

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Abstract: In this paper, it is attempted to predict the Bitcoin price accurately taking into consideration various parameters that affect the Bitcoin value. For the first phase of investigation, it is aimed to understand and identify daily trends in the Bitcoin market while gaining insight into optimal features surrounding Bitcoin price. The data set consists of various features relating to the Bitcoin price and payment network over the course of time, recorded daily. For the second phase of investigation, using the available information, we will predict the sign of the daily price change with highest possible accuracy.

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

Introduction

The objective of Bitcoin Prediction is to ascertain with what accuracy can the price of Bitcoin be predicted using different machine learning algorithm and compare their accuracy.

The objective of study to the price prediction of bitcoin by feature selection of different machine learning techniques. Intuitively, idea is to first transform order book data into features over time, referred as feature series and then to develop prediction models to consume volatility and feature series simultaneously.

Volatility as a measure of price fluctuations has a significant impact on trade strategies and investment decision as well as on option pricing and measures of systemic risk. Bitcoin, as a pioneer in the blockchain financial renaissance plays a dominant role in a whole cryptocurrency market capitalization ecosystem. Therefore, it is of great interest of data mining and machine learning community to be able to predict Bitcoin price fluctuations.

Bitcoin is a crypto currency which is used worldwide for digital payment or simply for investment purposes. Bitcoin is decentralized i.e. it is not owned by anyone. Transactions made by Bitcoins are easy as they are not tied to any country. Investment can be done through various marketplaces

known as "bitcoin exchanges". These allow people to sell/buy Bitcoins using different currencies. The largest Bitcoin exchange is Mt Gox. Bitcoins are stored in a digital wallet which is basically like a virtual bank account. The record of all the transactions, the timestamp data is stored in a place called Blockchain. Each record in a blockchain is called a block. Each block contains a pointer to a previous block of data. The data on blockchain is encrypted. During transactions the user's name is not revealed, but only their wallet ID is made public.

Bitcoin (BTC) is a novel digital currency system which functions without central governing authority. Instead, payments are processed by a peer-to-peer network of users connected through the Internet. Bitcoin users announce new transactions on this network, which are verified by network nodes and recorded in a public distributed ledger called the blockchain. Bitcoin is the largest of its kind in terms of total market capitalization value. They are created as a reward in a competition in which users offer their computing power to verify and record transactions into the blockchain. Bitcoins can also be exchanged for other currencies, products, and services. The exchange of the Bitcoins with other currencies is done on the exchange office, where "buy" or "sell" orders are stored on the order book. "Buy" or "bid" offers represent an intention to buy certain amount of Bitcoins at some price while "sell" or "ask" offers represent an intention to sell certain amount of Bitcoins at some price. The exchange is done by matching orders by price from order book into a valid trade transaction between buyer and seller.

1.Literature Survey

P. Ciaian, M. Rajcaniova, and D. Kancs, Appl.

Econ., vol. 48, no. 19, pp. 1799–1815, 2016

This is the first article that studies BitCoin price formation by considering both the traditional determinants of currency price, e.g., market forces of supply and demand, and digital currencies

specific factors, e.g., BitCoin attractiveness for investors and users. The conceptual framework is based on the Barro (1979) model, from which we derive testable hypotheses. Using daily data for five years (2009–2015) and applying time-series analytical mechanisms, we find that market forces and BitCoin attractiveness for investors and users have a significant impact on BitCoin price but with variation over time. Our estimates do not support previous finding that macro-financial developments are driving BitCoin price in the long run.

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

The goal of this paper is to ascertain with what accuracy the direction of Bitcoin price in USD can be predicted. The price data is sourced from the Bitcoin Price Index. The task is achieved with varying degrees of success by the implementation of a Bayesian optimised recurrent neural network (RNN) and a Long Short Term Memory (LSTM) network. The LSTM achieves the highest classification accuracy of 52% and a RMSE of 8%. The popular ARIMA model for time series forecasting is implemented as a comparison to the deep learning models. As expected, the non-linear deep learning methods outperform the ARIMA forecast which performs poorly. Finally, both deep learning models are benchmarked on both a GPU and a CPU with the training time on the GPU outperforming the CPU implementation by 67.7%.

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

In this project, they attempt to apply machine-learning algorithms to predict Bitcoin price. For the first phase of our investigation, we aimed to understand and better identify daily trends in the Bitcoin market while gaining insight into optimal features surrounding Bitcoin price. Our data set consists of over 25 features relating to the Bitcoin price and payment network over the course of five years, recorded daily. Using this information we were able to predict the sign of the daily price change with an accuracy of 98.7%. For the second phase of our investigation, we focused on the Bitcoin price data alone and leveraged data at 10-minute and 10-second interval timepoints, as we saw an opportunity to evaluate price predictions at varying levels of granularity and noisiness. By predicting the sign of the future change in price, we are modeling the price prediction problem as a binomial classification task, experimenting with a custom algorithm that leverages both random forests and generalized linear models. These results had 50-55% accuracy in predicting the sign of future price change using 10 minute time intervals.

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

This work explored the optimal conditional heteroskedasticity model with regards to goodness-of-fit to Bitcoin price data. It is found that the best model is the AR-CGARCH model, highlighting the significance of including both a short-run and a long-run component of the conditional variance.

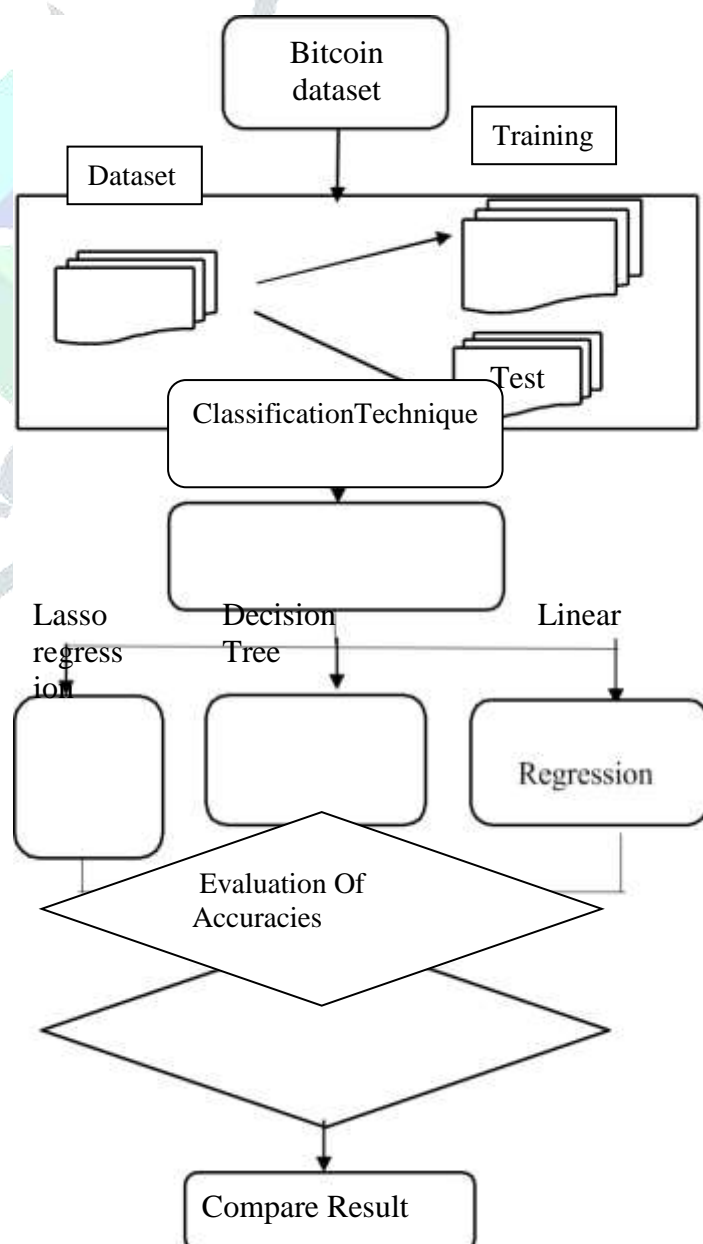
The references are mentioned at the end of the paper.

2. Methodology

A. System Architecture

In this project, the bitcoin dataset is collected from Quandl. The dataset is trained and tested first. The dataset is classified using the three different algorithms like Lasso algorithm, linear regression and decision tree. From the three algorithms predictions the accuracies of the algorithms is measured. Finally results are compared and the accurate price is taken.

Fig 1. System Architecture



B. Machine Learning Classifiers

- A. Linear Regression – Linear regression is a type of regression analysis where the number of independent variables is one and there is a linear relationship between the independent(x) and dependent(y) variable.

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

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

- B. Lasso Regression – Lasso (least absolute shrinkage and selection operator; also Lasso or LASSO) is a regression analysis method that performs both variable selection and regularization in order to enhance the prediction accuracy and interpretability of the statistical model it produces.

- C. Decision Tree – Decision trees are constructed via an algorithmic approach that identifies ways to split a data set based on different conditions. It is one of the most widely used and practical methods for supervised learning. Decision Trees are a non parametric supervised learning method used for both classification and regression tasks.

3.Results And Discussion

The test set for this evaluation experiment calculated value. Python software platform is use to perform the experiment. The PC for experiment is equipped with an Intel Core 2.4GHz Personal laptop and 3GB memory. The proposed scheme is tested using ordinarily machine learning. From the simulation of the experiment results, we can draw to the conclusion that this method is robust to many kinds Bitcoin data set images.

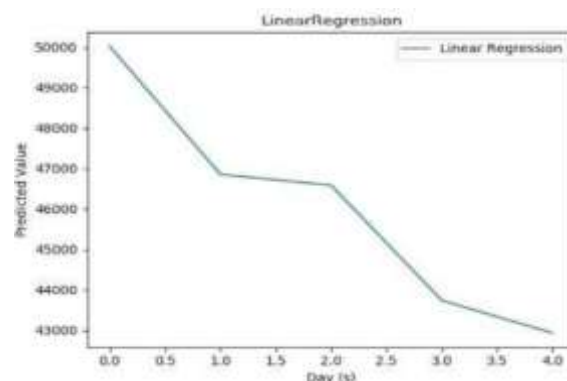


Fig 2.Forecast Price Of Linear Regression

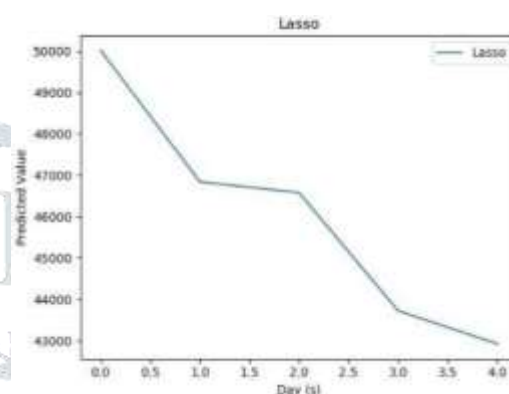


Fig 3.Forecast Price Of Lasso Regression

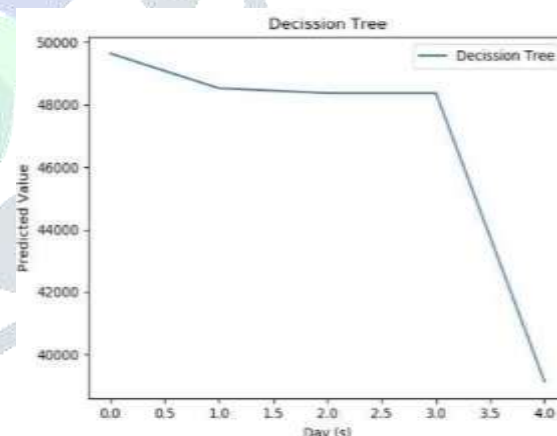


Fig 4.Forecast Price Of Decision Tree

5. REFERENCES

- [1] D. Shah and K. Zhang, "Bayesian regression and Bitcoin," in 52nd Annual Allerton Conference on Communication, Control, and Computing (Allerton), 2015, pp. 409-415.
- [2] Huisu Jang and Jaewook Lee, "An Empirical Study on Modelling and Prediction of Bitcoin Prices with Bayesian Neural Networks based on Blockchain Information," in IEEE Early Access Articles, 2017, vol. 99, pp. 1-1.
- [3] F. Andrade de Oliveira, L. Enrique Zúñiga and M. de Azevedo Reis; C. Neri Nobre, "The use of artificial neural networks in the analysis and prediction of stock prices," in IEEE International Conference on Systems, Man, and Cybernetics, 2011, pp. 2151-2155.
- [4] M. Daniela and A. BUTOI, "Data mining on Romanian stock market using neural networks for price prediction". informatica Economica, 17, 2013
- [5]. Thearasak Phaladi, Thanisa Numnonda "Machine Learning Models Comparison for Bitcoin Price Prediction" 2019 IEEE.

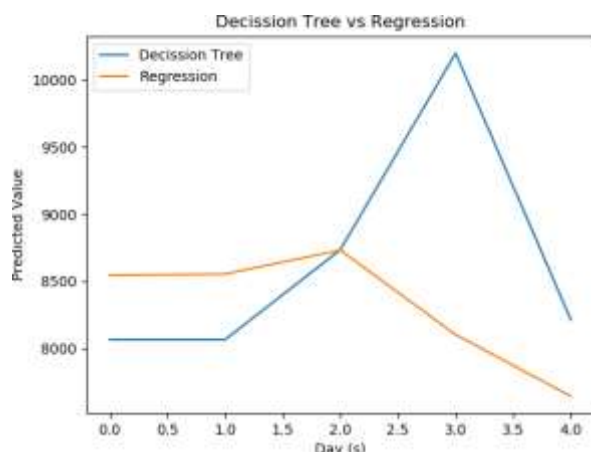


Fig 5. Represents The Decision Tree Vs Linear Regression

Table 1

	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

	Decision Tree	Linear Regression
Accuracy	98.3895	99.0558

Table 1 shows the Predicted values of Bitcoin data set using Lasso and Regression algorithm MSE MAE R-Squared RMSE & Accuracy are compared each other.

Table 2 shows forecasted values of Bitcoin data set using Decision tree and Regression algorithm finding the accuracy and compared each other.

4. CONCLUSION

As Bitcoin is very fluctuating in nature, segregated witness and distributed immutable ledger as fetching the real-time data and put into the regression models. According to the model analysis, the Lasso regression model provides the accuracy is 98.6% and linear regression model accuracy is 98.7% for the prediction. The forecasting using the decision tree accuracy is 97.5% and by the linear regression will be the 97.7%. Therefore, to the best results of all models, datasets should be always updated.