

Abstract of Big Data Analytics Project Research

Shahzad Ahmed (501211922)

CIND820 XJH - Big Data Analytics Project

Toronto Metropolitan University

Abstract

Title:

Predicting Cryptocurrency Prices Using Machine Learning Algorithms.

With the advancement and modernization of technology, various industries are rapidly evolving to adapt to the latest global trends. One such change that has been taking place is the increasing prevalence of cryptocurrency as a medium of exchange and investment. This shift towards digital currencies represents a significant departure from traditional fiat currencies and stock exchange practices and It's the time to understand what digital money really means for everyone's future. I would like to direct the readers to an engaging article by Alex Hern that delves into the world of Bitcoin and cryptocurrencies, discussing their significance as digital currencies and their potential impact on our future. [\[1\]](#)

I have reviewed the article and identified five key takeaways:

1. Cryptocurrencies, like Bitcoin, are a novel form of decentralized currency that allows individuals to exchange funds without the involvement of traditional financial institutions. This has the potential to disrupt the conventional banking system and reshape the financial landscape.
2. Blockchain technology forms the underlying structure for cryptocurrencies and functions as a decentralized ledger that logs transactions and is upheld by a group of computers. Its versatility extends far beyond finance and encompasses various areas, such as supply chain management, voting systems, and identity authentication.
3. Cryptocurrencies have been notorious for their high degree of volatility, with their worth fluctuating dramatically. This has raised concerns about their stability and long-term viability as a store of value.
4. Due to their anonymous and decentralized nature, cryptocurrencies have been associated with unlawful activities such as drug trafficking and money laundering. Consequently, governments and regulatory bodies have been closely monitoring their usage.
5. The advent of cryptocurrencies has ignited a broader discussion about the role of technology in society and its potential to disrupt established power structures. Although it remains to be seen how this will unfold, it is evident that cryptocurrencies and blockchain technology could have a significant influence on our future.

CB Insights [\[2\]](#) published an article that delves into the impact of blockchain technology on traditional banking and payment systems. The article highlights how blockchain technology can enable decentralized payment systems that facilitate faster and more secure transactions between financial institutions. This is important to our study as it sheds light on the potential influence of blockchain technology on the finance industry and how it could impact cryptocurrency prices. The article offers five key takeaways:

1. The banking industry could potentially be disrupted by blockchain technology, which can offer faster, more cost-effective, and secure transactions by eliminating the necessity for intermediaries like banks to facilitate transactions.

2. By leveraging blockchain technology to simplify cross-border payments, financial institutions can minimize their reliance on conventional payment processors such as SWIFT. This approach can substantially decrease the expenses and time required for global transactions.
3. Smart contracts are a type of self-executing contract that encodes the terms of an agreement between a buyer and a seller into code lines. They have the capability to automate several elements of financial transactions, including loan origination and settlement, which can potentially increase efficiency and reduce costs.
4. Blockchain technology can enhance transparency and decrease fraud by providing an immutable and permanent record of transactions. This can help financial institutions monitor and prevent fraudulent activities.
5. While the banking industry is still in the early stages of adopting blockchain technology, many financial institutions are exploring ways to incorporate this technology into their operations. Although there are technical and regulatory hurdles to overcome, the potential benefits of blockchain technology for the banking industry are significant.

Overall, both articles offer insights into the broader landscape of cryptocurrency and blockchain technology, which can help inform our study on predicting cryptocurrency prices using machine learning algorithms.

Research Questions:

What are the most effective predictive and time series analysis techniques for forecasting short-term closing prices of cryptocurrencies? Which features are influential predictors for classifying the short-term closing prices of selected cryptocurrencies?

What is the correlation between the predicted prices generated by machine learning algorithms and the actual prices of the chosen cryptocurrencies?

Scope of the Research:

The project aims to use machine learning algorithms to predict short-term closing prices of different cryptocurrency companies. The dataset for this project is obtained from Kaggle Inc. which contains historical data for the chosen cryptocurrencies. The objective is to compare the predicted prices with the actual prices and identify which cryptocurrency presents the most profitable opportunity for short-term trading.

To answer the research question, we will explore different machine learning algorithms and time-series analysis techniques, such as SMA, SE, ARIMA, SARIMA, PROPHET and deep learnings. We will compare the efficiency and stability of these techniques to identify the most effective ones for our purpose.

Data Source:

The data set used in this project is obtained from Kaggle Inc. which contains historical data for the chosen cryptocurrencies. The data is related to the closing prices of each of the six different cryptocurrency companies and has been used in previous researches.

Limitations of the Research:

The scope of this study is restricted to specific cryptocurrency companies and the historical data that is accessible for them, and thus, it may not accurately reflect the overall cryptocurrency market. The machine learning algorithms utilized in the analysis rely on historical data, and the future value of cryptocurrencies can be influenced by unpredictable factors, such as changes in regulations, market sentiment, and global events. The precision of the forecasts could be influenced by the quality and comprehensiveness of the data used.

Background Information:

Cryptography is used to secure cryptocurrency, which is a digital or virtual form of money. It is decentralised and not under the jurisdiction of a single entity, such as a government or bank, unlike conventional currencies. It is a distributed ledger used to record cryptocurrency transactions and is used to secure and authenticate user data. The worldwide financial system has been significantly impacted by this innovative technology, and its future growth potential is enormous. The first cryptocurrency, Bitcoin, was released in 2009, and since then, the market has expanded to encompass several other cryptocurrencies, with a market capitalization of over \$1 trillion. Even though cryptocurrencies are a relatively new addition to the financial world, their impact has been significant, and they are expected to continue influencing the financial landscape in the future.

Notably, the data set we are going to use in this study, this same data set was employed in a previous study by a researcher Manomi Koroth, whose report is available at

<https://github.com/Mkoroth97/CIND820-2021/blob/main/CIND820-FINAL%20REPORT.pdf>

Upon analyzing the report, some potential limitations and avenues for enhancement were identified. For example, the report utilizes a basic linear regression model for predicting cryptocurrency prices, but fails to compare its performance with other machine learning models and techniques. To enhance the model's accuracy, experimenting with other models and techniques would be worth considering. Additionally, the report does not provide a comprehensive evaluation of the model's performance, such as mean absolute error, mean squared error, or R-squared. By incorporating these metrics, a more thorough assessment of the model's accuracy can be conducted, and areas for further improvement can be identified. From the investors point of view, the report is deficient in terms of providing insightful analysis, including but not limited to the comparison of daily returns vs volatility as well as technical analysis. These aspects will also be addressed in this study.

Specific Area of Research:

The specific area of research in this project is the utilization of machine learning algorithms in time-series analysis to predict the future prices of selected cryptocurrencies and identify profitable opportunities for short-term investment.

Data Set:

The project aims to use data to achieve the goal [3].

<https://www.kaggle.com/datasets/sudalairajkumar/cryptocurrencypricehistory>

Gethib Link of this Study:

<https://github.com/shahgem/CIND-820>

Reference

- 1- Hern, A. (2018, January 29). *Bitcoin and cryptocurrencies – what digital money really means for our future*. The Guardian.
<http://www.theguardian.com/technology/2018/jan/29/cryptocurrencies-bitcoin-blockchain-what-they-really-mean-for-our-future>
- 2- *How Blockchain Could Disrupt Banking*. (2022, October 18). CB Insights Research.
<https://www.cbinsights.com/research/blockchain-disrupting-banking/>
- 3- Cryptocurrency Historical Prices. (n.d.). Cryptocurrency Historical Prices | Kaggle.
<https://datasets/sudalairajkumar/cryptocurrencypricehistory>