Exploring the Correlation and Trading Strategy Optimization of Bitcoin, Dogecoin, and Gold in the Cryptocurrency Market

Peiyang Wu, Baichen Shi

NYU Shanghai

Abstract

This project aims to find the correlations between Dogecoin, Bitcoin, and gold, based on that, we want to examine the existing pattern for now and see if we could generate some meaningful predictions for future investment. The model will be built using historical price data for cryptocurrencies and gold. Python will be the primary language used to implement machine learning algorithms to the real data, including K-means, KNN, SVM, Trees, Reinforcement Learning, and Regressions. Additionally, SIRS and SEIR can be used to explore the data. The significance of this project lies in the rapid growth of cryptocurrencies and the fast-changing nature of the market, making it critical to understand how these digital assets are likely to change with time and how they relate to traditional assets like gold. The project has practical implications for investors looking to optimize their trading strategies and make better decisions regarding their cryptocurrency investments.

Research question

How many elements are affecting the price fluctuation of Dogecoin, and Bitcoin, for instance, transaction cost, media phenomenon, etc?

How many elements are affecting the price fluctuation of gold, US dollars, Political instability, etc? Are they a time series? Are they affected by the spread of Covid?

Based on historical data, develop a model that uses the past stream of daily prices to determine on each date what the trader should trade (buy, sell, or hold the assets in their portfolio) between cash, gold, BitCoin, and Dogecoin. Can the model give the best profit? If so, present evidence. Note, we need to consider that gold is traded only when the market is open and there is a commission for each transaction.

How does the price of Gold and Cash relate to cryptocurrencies, and how does this impact the trading strategy?

Are there any suggestions for the traders?

Significance

The significance of this project lies in the growing importance of cryptocurrency as a new form of investment and payment. Cryptocurrency has been gaining traction in recent years, and its market cap has been increasing rapidly, with Bitcoin leading the pack. With the rise of various new cryptocurrencies such as Dogecoin, it has become more challenging for traders to identify

the best investment opportunities in the market.

In this context, a data-driven approach to predict the future prices of cryptocurrencies can provide valuable insights to traders and investors. After conducting extensive research, we discovered that many articles analyze the correlation between gold and bitcoin, primarily utilizing data from 2010 to 2020. While investigating bitcoin on a decade-by-decade basis may be reasonable, it is important to note that bitcoin has experienced a significant surge in value from around 2020 to the present day. As bitcoin continues to gain popularity, other cryptocurrencies such as DogeCoin have also begun to emerge and grow. Therefore, it may be beneficial to expand our analysis beyond the previous decade and include the current trends in the cryptocurrency market. By using machine learning algorithms to analyze historical price data, we can identify patterns and trends that can help predict the future prices of cryptocurrencies.The inclusion of other variables such as gold and cash prices can also provide a more comprehensive analysis of the market.

Furthermore, this project can help traders and investors make informed decisions about the optimal strategy for trading in the cryptocurrency market. By determining the best parameters and strategies, traders can maximize their returns while minimizing transaction costs. This can also have significant implications for businesses that are looking to invest in cryptocurrency or accept it as a form of payment.

Overall, this project can contribute to the understanding of the cryptocurrency market and provide insights into its future trends and behavior. It can also help traders and investors make informed decisions about their investments, ultimately contributing to the growth and stability of the cryptocurrency market.e adjustments based on the research and update their strategy in the post-pandemic era.

Project Design and Feasibility

The project aims to investigate the relationship between cryptocurrency prices and gold prices. This project is significant because of the growing interest in cryptocurrency and the increasing importance of gold as a safe-haven asset during times of economic uncertainty. Understanding the correlation between these two assets and their response to economic policy uncertainty can provide valuable insights into their potential as investment instruments.

To achieve this objective, we will collect historical price data for cryptocurrency and gold from various sources, including Kaggle, Yahoo Finance, and goldprice.org. The collected data will be cleaned, preprocessed, and organized using Python programming language. Python offers a wide range of libraries and tools for data analysis, visualization, and machine learning, making it an ideal tool for this project.

The collected data will be analyzed using various machine learning algorithms, such as K-means, KNN, SVM, Trees, Reinforcement Learning, and Regressions. Additionally, we can explore the use of SIRS, SEIR models to capture the impact of economic policy uncertainty on these assets. Time-series analysis can also be included to capture the trend and seasonality of cryptocurrency and gold prices.

Furthermore, we will also review existing literature on the relationship between cryptocurrency

and gold prices, as well as their reaction to economic policy uncertainty. In "The Bitcoin gold correlation puzzle" by Dirk G. Baur (2021), the author investigates the correlation between Bitcoin and gold prices from 2010 to 2020. The study found that the correlation between the two assets was positive and statistically significant. However, the correlation varied across time, with higher correlations during times of economic stress.

In "Bitcoin, gold, and the VIX: short- and long-term effects of economic policy uncertainty" by Chris Burniske & Jack Tatarl, the authors analyze the relationship between Bitcoin, gold, and the VIX, a measure of economic policy uncertainty. The study found that Bitcoin and gold have a weak positive correlation and a negative correlation with the VIX. The authors also found that economic policy uncertainty had a short-term negative impact on Bitcoin and gold prices.

The article "Is Bitcoin Similar to Gold? An Integrated Overview of Empirical Findings" by Nikolaos A. Kyriazis explores whether Bitcoin and gold share similar characteristics as stores of value. The author provides a comprehensive analysis of existing empirical evidence and argues that while both assets exhibit some similarities, such as limited supply and resistance to inflation, they also have significant differences. For example, gold has a long history as a store of value, whereas Bitcoin is a relatively new and volatile asset. The article suggests that while Bitcoin may have some potential as a store of value, it cannot be considered a replacement for gold.

The results of our analysis can provide valuable insights for investors and policymakers. For instance, our findings can help investors develop better portfolio diversification strategies by understanding the correlation between cryptocurrency and gold prices. Policymakers can also use the insights to develop policies that promote economic stability and reduce economic policy uncertainty.

In conclusion, this project aims to investigate the relationship between cryptocurrency prices and gold prices, as well as their reaction to economic policy uncertainty, using machine learning algorithms and existing literature. The results of this project can provide valuable insights for investors and policymakers, making it a significant and feasible research project.

Background

As a group of students covering the multi-discipline of Computer Science and Data Science concentrating on Finance, we have taken Machine Learning, Econometrics, Data Structure, Probability and Statistics, Foundation and Finance, from which we learned the techniques to deal with data using traditional statistical methods and machine learning algorithms. Moreover, we cultivate business sense and awareness from previous research and professional experience, which help us to raise improvement strategies to deal with real business practice.

Mentor & Feedback

The proposed research will be supervised by Dr. Chen and Dr. Shapir, who will provide feedback and evaluate the project. The schedule for feedback and evaluation will be as follows:

- Regular meetings will be held with the mentors on a bi-weekly basis to discuss the progress

of the research project.
- The first draft of the research proposal has been submitted to the supervisors before the deadline of the application. The supervisors have provided feedback on the proposal, we are working with advising professors constructively on the direction of this project.

We are focusing on some significant elements of the research:

- Clarity and coherence of research questions and objectives
- Relevance and originality of the research topic
- Appropriateness and feasibility of research methods and data analysis techniques
- Overall academic rigor and quality of the proposed research

The mentors will provide feedback and suggestions for improvement as needed to ensure the research meets the required standards. Any further feedback or revisions required by the mentors will be addressed promptly and thoroughly.

Dissemination of Knowledge

The findings and improvement strategies are expected to be presented with a summary report and interactive data visualization if possible. Moreover, we will be glad to present our findings and research process at the Undergraduate Research Symposium.

The summary report would include ① Problem presentation (define the research problem and explain the importance of the problem) ② data analysis and processing process ③ final analysis results (including visualization) ④ corresponding solutions and feasibility demonstration

References

Baur, Dirk G. "The Bitcoin gold correlation puzzle." Economics Letters, vol. 204, 2021, p. 109861.

Burniske, Chris and Jack Tatar. "Bitcoin, gold, and the VIX: short- and long-term effects of economic policy uncertainty." Journal of Alternative Investments, vol. 21, no. 1, 2018, pp. 16-25.

Kyriazis, Nikolaos A. "Is Bitcoin Similar to Gold? An Integrated Overview of Empirical Findings." International Journal of Financial Studies, vol. 9, no. 3, 2021, p. 48.