Cryptocurrency Analysis
(COMP3125 Individual Project)

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Abstract—**Cryptocurrency has emerged as a significant asset class, with Bitcoin leading the charge in terms of popularity and market impact. This project investigates the historical trends of cryptocurrency prices, identifies the most volatile cryptocurrencies, and explores correlations between various cryptocurrencies. The study further examines the feasibility of predicting cryptocurrency prices using historical data and technical indicators. Machine learning, particularly the Long Short-Term Memory (LSTM) network, is employed for time series forecasting to predict future price movements. The research aims to provide valuable insights into the dynamics of cryptocurrency markets and the potential for predictive modeling in this volatile environment.**

Keywords— cryptocurrency, Bitcoin, volatility, machine learning, LSTM

I. INTRODUCTION

Cryptocurrency has rapidly gained popularity and is increasingly being recognized as an alternative form of currency alongside traditional actual money. The growing interest in digital assets has led to significant market fluctuations and a dynamic trading environment. This project aims to analyze historical trends in cryptocurrency prices, identify the most volatile cryptocurrencies, and explore the relationship between global events and cryptocurrency prices. Additionally, the study will focus on predicting cryptocurrency prices based on historical data and technical indicators using machine learning models.

II. DATASETS

A. Price History Dataset:

This dataset provides historical price movements of various cryptocurrencies (Bitcoin was chosen as it is the most popular Cryptocurrency), available at Kaggle.

B. All Cryptocurrencies Dataset:

This dataset includes a comprehensive list of cryptocurrencies and their attributes, available at Kaggle.

C. Cryptocurrency Pairs Dataset

This dataset offers minute-resolution data on cryptocurrency pairs, available at Kaggle.

The All Cryptocurrencies Dataset, as well as the Cryptocurrency Pairs Dataset contained too many files so the data needed to be narrowed down to fit properly. This was done using excel. For the All Cryptocurrencies Dataset, I managed to delete data from very small cryptocurrencies that had very little volume and a very low market cap. For the Cryptocurrency Pairs Dataset, there were many different csv files, this meant getting meaningful data would be difficult, so I decided to go with a Bitcoin pairs dataset, as Bitcoin is the most popular cryptocurrency that almost everyone knows of.

III. METHODOLOGY

This study will address four key research questions:

A. What are the historical trends of cryptocurrency (Bitcoin) prices?

Data analysis was performed using line charts to visualize historical price trends. Moving averages were also used to show bullish and bearish runs throughout the coins' history.

B. Which cryptocurrencies have the most volatility?

Standard deviation of daily returns was used to measure volatility across different cryptocurrencies. A bar chart was created to visualize the top 10 most volatile cryptocurrencies.

C. How do different cryptocurrencies correlate with each other in terms of price movements?

Correlation matrices will be used to evaluate the relationships between different cryptocurrency price movements.

D. Can we predict the price of a cryptocurrency based on historical data and technical indicators?

A machine learning model, specifically a Long Short-Term Memory (LSTM) network, will be used for time series forecasting.

By analyzing these aspects, this project aims to provide insights into cryptocurrency market behavior and the feasibility of predicting future price movements based on historical trends and other influences.

IV. RESULTS

In this section, present your findings using an appropriate method, such as equations, numerical summaries, or visualizations like charts and graphs. Clearly explain all results and provide guidance on how to interpret them. If any unexpected results arise, discuss possible reasons or contributing factors. To improve clarity and organization, consider using subsections (e.g., A, B) to separate different aspects of your results.

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A. Result A

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B. Results B

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C. Results C

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a. Sample of a Table footnote. (*Table footnote*)

Fig. 1.   Example of a figure caption. (*figure caption*)

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V. DISCUSSION

Every method/project has its shortage or weakness. Please discuss the unsatisfied results in your project. And discuss the feasible suggestions of future work to revise/improve your result.

Example: xxx

VI. CONCLUSION

In this part, you should summarize your project. What important results did you find for your topic and what's the effect of this result on the real-world?

Example: xxx

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