

# Cryptocurrency market data analysis project

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# Project Topic

Analyzing the correlations among Fear and Greed Index, Bitcoin Price, and the S&P Cryptocurrency Broad Digital Asset Index

# Introduction

This project is to analyze the correlations among Fear and Greed Index, Bitcoin Price, and the S&P Cryptocurrency Broad Digital Asset (BDA) Index in the cryptocurrency market.

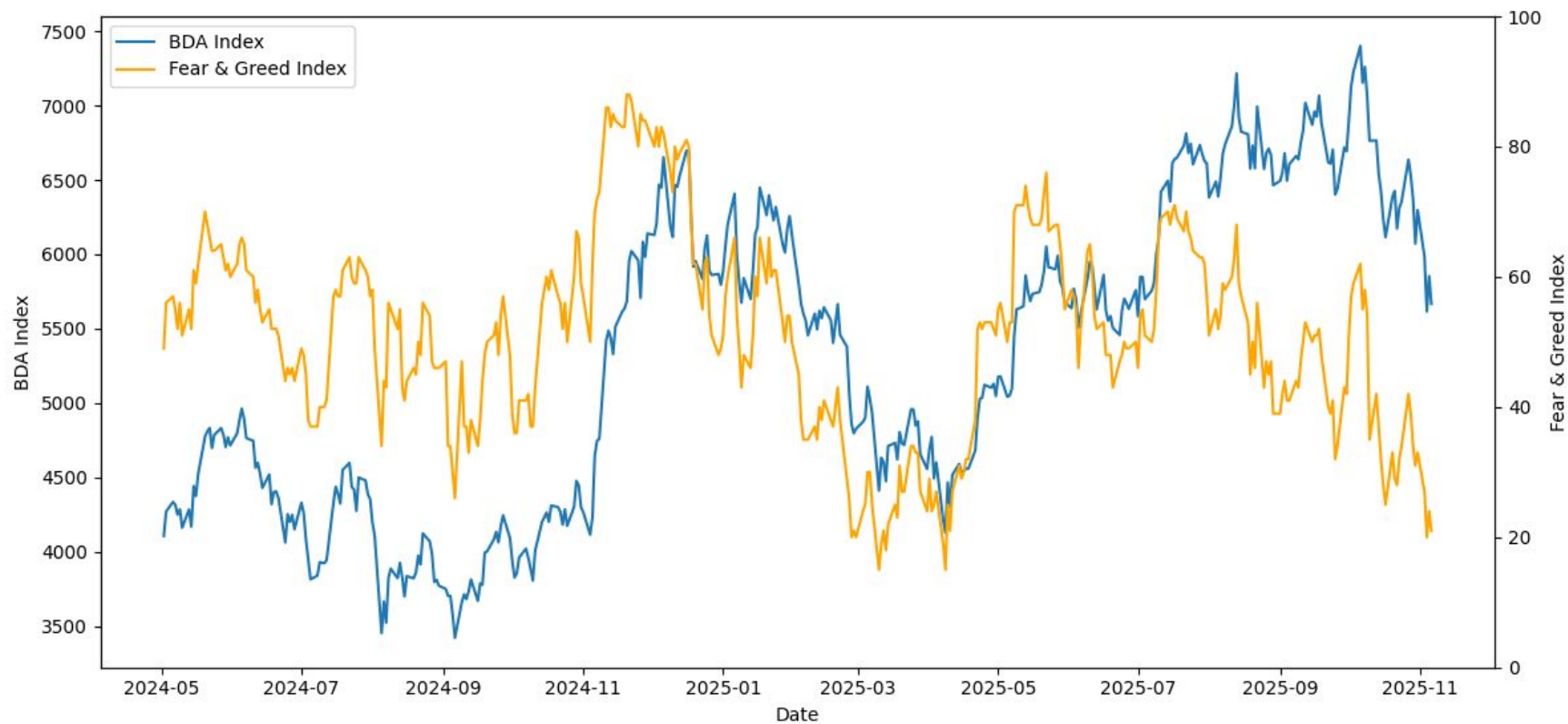
In particular, the S&P Cryptocurrency Broad Digital Asset (BDA) Index is the cryptocurrency market benchmark index. This benchmark index is designed to track the performance of a wide range of investable digital assets that meet specific liquidity and market capitalization criteria.

The Fear and Greed Index measures cryptocurrency market sentiment. It uses a combination of social signals and market trends to determine the overall sentiment of crypto investors. This index ranges from 0 to 100, where a lower value indicates extreme fear, and a higher value indicates extreme greed. This index provides insights into whether the market may be undervalued or overvalued.

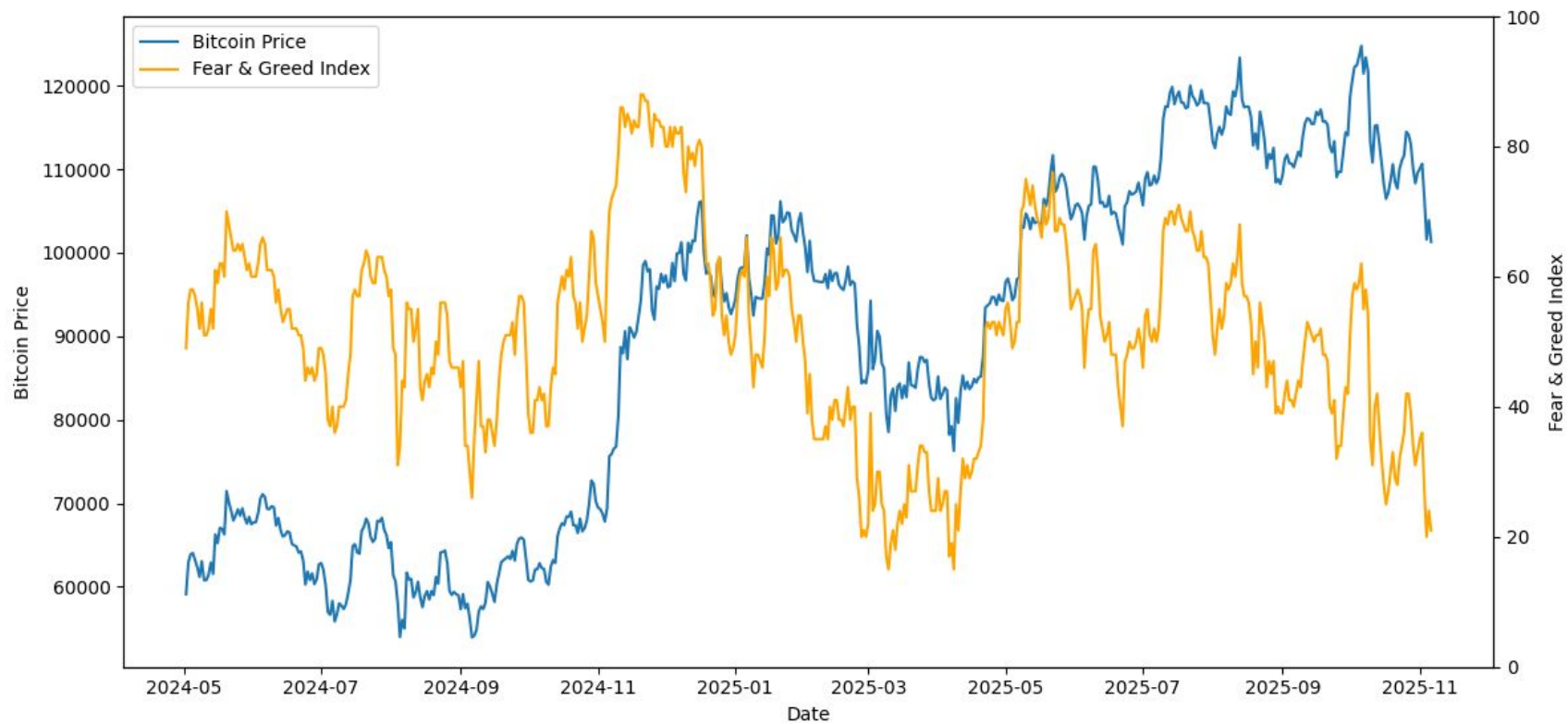
# Data Sources

Data source #	Name / short description	Source URL	Type	List of fields	Format	Data size, number of data points you plan to use
1	Crypto Fear and Greed Index	<a href="https://coinmarketcap.com/charts/fear-and-greed-index/">https://coinmarketcap.com/charts/fear-and-greed-index/</a>	API	Value, Date	json	554
2	Bitcoin Prices	<a href="https://coinmarketcap.com/api/documentation/v1/#operation/getV2CryptocurrencyOhlcvHistorical">https://coinmarketcap.com/api/documentation/v1/#operation/getV2CryptocurrencyOhlcvHistorical</a>	API	Value, Timestamp	json	554
3	BDA Index	<a href="https://www.spglobal.com/spdji/en/indices/digital-assets/sp-cryptocurrency-broad-digital-asset-bda-index/#overview">https://www.spglobal.com/spdji/en/indices/digital-assets/sp-cryptocurrency-broad-digital-asset-bda-index/#overview</a>	File	Value, Date	xlsx	396

Fear & Greed Index vs BDA Index



Fear & Greed Index vs Bitcoin Price



BDA Index vs Bitcoin Price





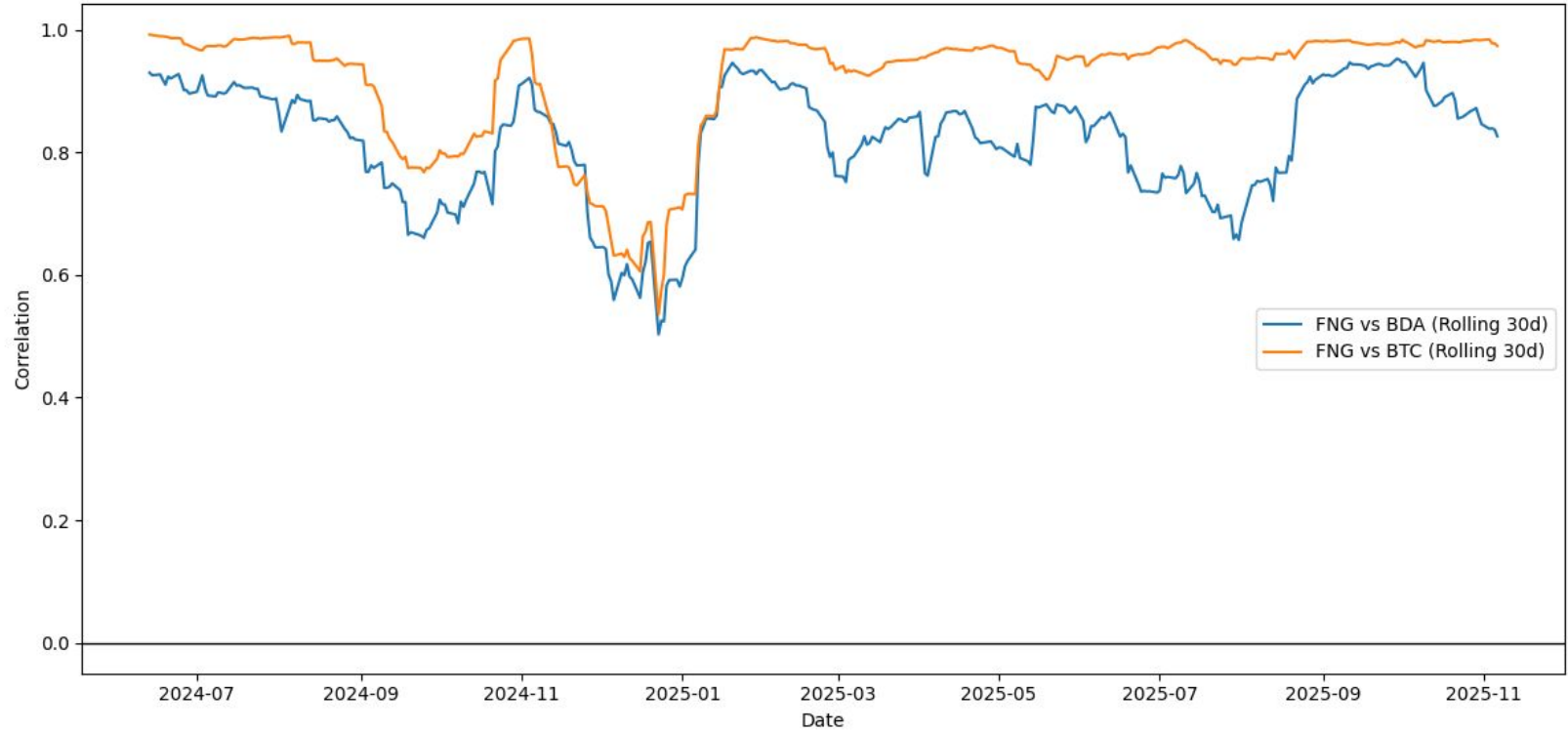
# Challenges

1. There's a query limit when calling CoinMarketCap API to retrieve Fear and Greed Index historical data. One query can return maximum 500 number of results. The solution is to call the API endpoint twice and combine the two returned xlsx files together into one file.
2. The scales of the indexes and bitcoin price are different when it comes to calculating the correlation coefficient.

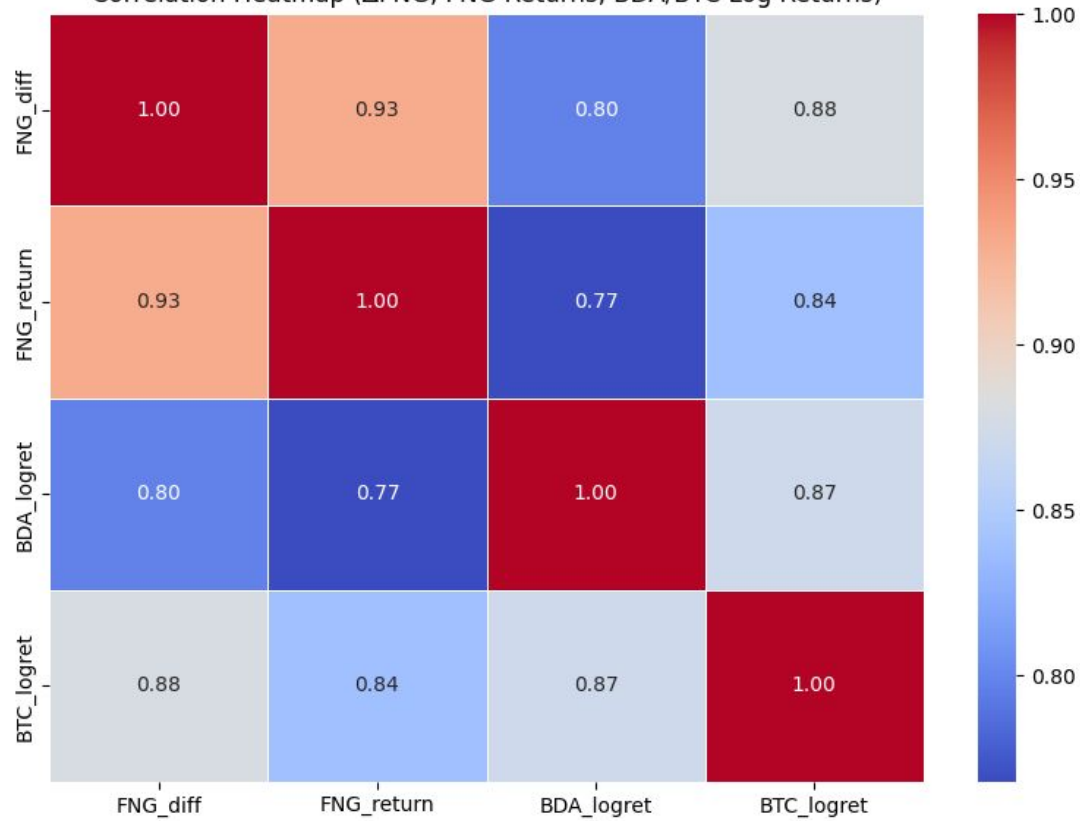
Since Fear and Greed Index is bounded, while BDA Index and BTC Price are unbounded and trending upward over time, I calculated daily log returns of BDA Index and Bitcoin Price in order to calculate the correlation coefficient between Fear and Greed Index and BDA Index and the correlation coefficient between Fear and Greed Index and Bitcoin Price.

For Fear and Greed Index, I used both approaches: daily returns and differences.

Rolling 30-Day Correlation ( $\Delta$ FNG vs Log Returns)



Correlation Heatmap ( $\Delta$ FNG, FNG Returns, BDA/BTC Log Returns)



# Summary of results

Correlation  $\Delta$ FNG vs BDA Log Returns: 0.7974

Correlation  $\Delta$ FNG vs BTC Log Returns: 0.8791

Correlation FNG Returns vs BDA Log Returns: 0.7679

Correlation FNG Returns vs BTC Log Returns: 0.8391

## Conclusions:

1. Fear and Greed Index has very high correlations with both Bitcoin Price and BDA Index.
2. Fear and Greed Index has higher correlation coefficient with Bitcoin Price compared to that with BDA Index.

**Thank You**