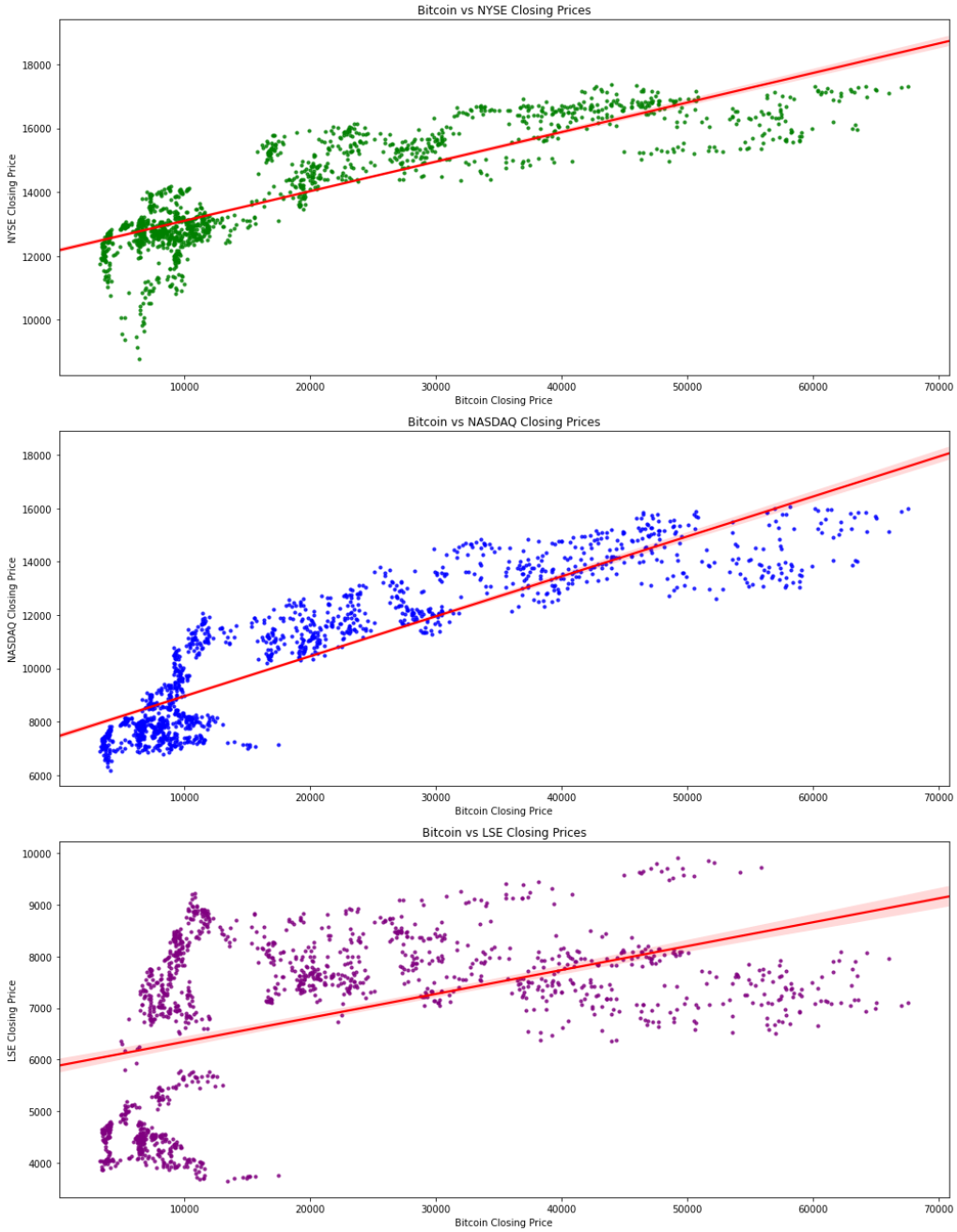
INFSCI 2415 Final Report
Relationship between Bitcoin and Traditional Stock Markets

Figure1: Scatter Plots with Regression Lines: Bitcoin vs Traditional Stock Exchanges



Legend:

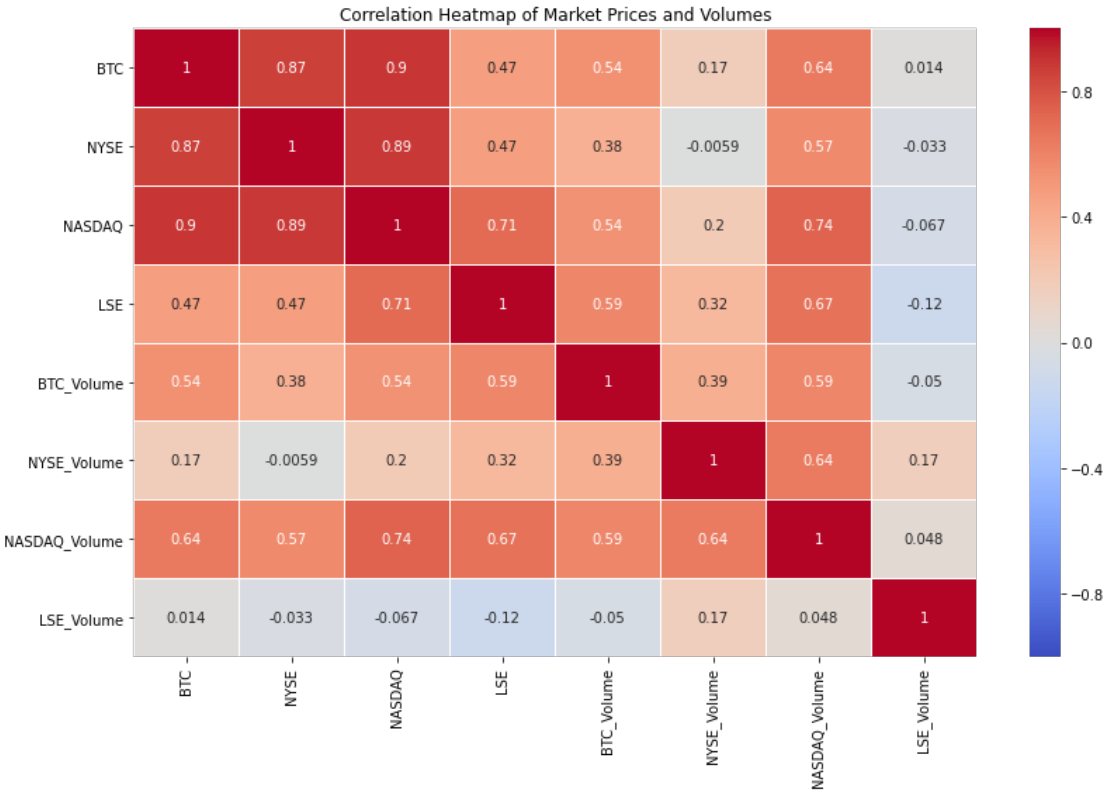
- **Green Dots**: Represent the relationship between Bitcoin's closing prices and the New York Stock Exchange (NYSE) closing prices.

- **Blue Dots**: Indicate the relationship between Bitcoin's closing prices and the NASDAQ closing prices.
- **Purple Dots**: Show the relationship between Bitcoin's closing prices and the London Stock Exchange (LSE) closing prices.
- **Red Lines**: Regression lines indicating the direction and potential strength of these relationships.

Findings:

1. **Bitcoin vs NYSE**: The scatter plot exhibits a positive trend, suggesting a potential moderate correlation between Bitcoin and NYSE closing prices.
2. **Bitcoin vs NASDAQ**: This positive correlation appears more pronounced with NASDAQ, indicating a stronger correlation between Bitcoin and NASDAQ closing prices.
3. **Bitcoin vs LSE**: The relationship seems less linear when compared to the other two markets, implying a weaker or more complex correlation with LSE.

Figure2: Correlation Heatmap of Market Prices and Volumes



Legend:

- **Cells**: Each cell represents the correlation between specific assets.
- **Color**: The intensity of the color indicates the strength of the correlation, ranging from deep blue (positive correlation) to deep red (negative correlation).

Findings:

1. **Volume vs Price Relationship**: A significant positive correlation is observed between Bitcoin's trading volume and its price, unlike the traditional exchanges where the correlation between volume and price is less pronounced.

2. **Bitcoin vs Traditional Markets**: Bitcoin's price shows a moderate to high correlation with traditional stock indices such as NYSE and NASDAQ.
3. **Intra-Market Correlation**: The correlation within traditional exchanges between price and volume is lower than that of Bitcoin, indicating a potential higher sensitivity of the Bitcoin market to changes in trading volume.

Data and method:

In this study, I utilized the Python, libraries such as Matplotlib, Seaborn, and Pandas, to create and analyze visualizations. The data, encompassing Bitcoin and traditional stock market indices (NYSE, NASDAQ, LSE), along with their respective trading volumes, were sourced from reliable financial databases. These datasets span several years, providing a comprehensive view of market behaviors over time.

The analysis was primarily conducted in a Jupyter Notebook environment. Key methods in the analytical process included:

- **Seaborn's 'regplot'** for creating scatter plots with regression lines, helping to visually assess correlations between Bitcoin and traditional stock markets.
- **Pandas** for data manipulation and preprocessing, ensuring data quality and facilitating efficient analysis.
- **Matplotlib's 'plot' function** for generating time series plots, illustrating the trends and movements in the financial markets.
- **Heatmap generation** using Seaborn, to visually represent the correlation matrix between different market indices and trading volumes, offering insights into their interrelated dynamics.

Significance Statement:

- **Market Insight**: They offer valuable insights into the dynamic relationship between Bitcoin, an emerging digital asset, and traditional stock markets. This understanding is crucial for investors, economists, and policymakers, especially considering the growing integration of cryptocurrencies in the financial landscape.
- **Volatility and Correlation Analysis**: Our analysis highlights the unique volatility profile of Bitcoin compared to more traditional assets, and explores the extent of correlation between these diverse markets.
- **Investment Strategy Implications**: The findings could aid investors in developing more informed investment strategies, particularly in the context of portfolio diversification and risk management.

Dataset: https://www.kaggle.com/datasets/adilbhatti/bitcoin-and-stock-exchanges/data

GitHub: https://github.com/NikolaPeng/2415FinalProject