Bitcoin Price Analysis Project Report
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Introduction

This project involves analyzing Bitcoin's historical price trends using a dataset spanning from April 28, 2013, to July 31, 2017. The objective was to uncover patterns in price movements, evaluate relationships between key metrics, and identify anomalies or significant events within the data.

Methodology

The dataset was processed and analyzed through comprehensive data cleaning, where non-numeric entries in the "Volume" and "Market Cap" columns were replaced with NaN and interpolated. The "Date" column was converted to datetime format to enable time-series analysis, and the dataset was sorted chronologically with duplicate entries removed. Statistical analysis included calculating yearly, quarterly, and monthly average prices using resampling methods, computing daily percentage changes in closing prices, and utilizing rolling averages and standard deviations to smooth trends and detect anomalies.

Implementation Details

The analysis was performed using Python, leveraging key libraries including Pandas for data cleaning, manipulation, and resampling, NumPy for numeric calculations such as percentage changes and logarithmic transformations, and Matplotlib and Plotly for visualizing trends, anomalies, and candlestick plots.

Results

In terms of yearly trends, Bitcoin's yearly average price steadily increased from $257.47 in 2013 to $1,628.62 in 2017, with the most significant rise occurring in 2017. The upward trend began in 2016, marking a shift towards higher adoption and trading activity. Quarterly and monthly insights revealed that the highest quarterly average occurred in Q2 2017, with Bitcoin reaching an average price of $1,912.55, while monthly averages showed a significant spike in May 2017, when the average closing price surged to $1,895.38.

Daily price fluctuations exhibited high volatility, with the largest single-day increase occurring on November 18, 2013, at approximately 68%, coinciding with major speculative trading activity during the early adoption phase. Anomalies were identified during periods of extreme price changes, such as December 2013 and June 2017, coinciding with speculative bubbles and market corrections. These anomalies were visualized using rolling statistics, highlighting deviations from the long-term trend.

The logarithmic analysis revealed consistent long-term growth patterns despite short-term volatility, indicating sustained increases in Bitcoin's value over the analyzed period. This approach effectively captured the overall upward trajectory while minimizing the impact of extreme fluctuations.

Conclusion

The analysis of Bitcoin's historical data revealed significant growth, particularly from 2016 onwards, with pronounced volatility during speculative phases. Market anomalies such as large single-day price changes aligned with major market events, while logarithmic scaling effectively captured the overall upward trajectory, minimizing the impact of extreme fluctuations. Resampling techniques highlighted critical periods of growth, especially during 2017, when Bitcoin's adoption and trading volume surged dramatically.

This study underscores Bitcoin's dynamic nature as a financial asset, driven by market sentiment, adoption, and speculative interest. Future analyses can benefit from exploring external factors such as regulatory changes and macroeconomic trends. The Python code and detailed documentation for this analysis can be accessed using the following drive link.

[Data Analytics Final Project](#)