Group 13 - Statify

Project title

Statistical analysis of the bitcoin price volatility in response to the market events

Brief Description

The case study examines the statistical correlation between the volatility of the bitcoin price for the years 2020-2024 and major market events such as institutional adoptions, regulatory announcements, and macroeconomic indicators. To achieve this goal, we will use daily price data, as well as classified event variables, and we will quantify the impact of different news types on the stability of the Bitcoin price and develop predictive models to forecast Bitcoin's volatility. This paper attempts to offer empirical support for risk management perspective and attempts to add to the emerging literature on the market behavior in cryptocurrency by comprehensive statistical analyses.

Research Objective

The primary objective here is to determine whether there is a statistical relationship between important market events and the total price volatility of Bitcoin and to develop a model that predicts changes in the volatility following similar events.

Course Topics Covered

- **Probability Distributions** – Analysing whether Bitcoin returns are normal or require alternative models.
- **Inference** - Build confidence intervals for vol forecasts and effect of events.
- **Hypothesis testing** - Establish if the events in the market have the same impact on Bitcoin volatility.
- **Analysis of Correlation** - Investigate the correlation between severity of event and size of volatility.
- **Simple Linear Regression** - Build a Volatility Model

Data Source (Type: Data Type: Secondary/real-world quantitative and categorical data)

Price Data:

- Daily Bitcoin prices, volume and trading data (2020-2024)
- Historical cryptocurrencies market data for validation
- Source: Yahoo Finance API, CoinGecko API, TraderMade, Pynk, Kaiko Market Data etc

Event Data:

- Key Bitcoin news and regulator updates
- Governing decisions and policy changes
- Institution adoption news
- Source: Bitcoin.com News, Investopedia Cryptocurrency Regulation Section, SEC.gov & Federal Reserve, CoinDesk & Reuters etc)

Proposed Statistical Methods

Descriptive Statistics

- An overview of Bitcoin returns and volatility metrics
- Analysis of event frequency and visualisation of time series

Distribution Analysis:

- Tests for determining normalcy
- Alternate distributions fitted to Bitcoin return data

Hypothesis Testing:

- T-tests contrasting volatility before and after an event
- Examining variations in volatility among event types

Correlation Analysis:

- Event severity and volatility magnitude have a Pearson correlation.
- Analyzing cross-correlations for time relationships

Linear Regression:

- build a model Model
- Forecasting using residual analysis and prediction intervals

Program Language:

- R and Python

Team Members

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