# 📊 Trading Volume Spike Analysis: AAPL

## 1. Data Loading and Initial Inspection

* **Initial Inspection:** Using data.head(), data.info(), and data.shape, we get an overview of the data.
  + We see the first few rows of the data, including the different columns.

A screenshot of a computer

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*Figure 1. Dataset in pandas DataFrame*

* + data.info() reveals the data types of each column, presence of missing values (if any),

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*Figure 2. Dataset Information*

* + data.shape tells us the dataset contains a large number of rows (daily data) and several relevant columns for analysis.

## 2. Data Cleaning

* **Removing Redundant Data and Renaming Columns:** As seen above, there is an unnecessary header row “AAPL”. We go ahead to remove this unnecessary header row as it has no use.
* **Data Type Conversion:** The 'Date' column is converted to the correct datetime data type, allowing for proper time-series analysis. Other numeric columns are also converted to their appropriate numeric types, facilitating calculations and visualizations.
* **Cleaned Data:** The final cleaned\_dataDataFrame is well-structured, with appropriate column names and data types, ready for in-depth analysis.

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*Figure 3. Cleaned dataset*

## 3. Data Exploration and Visualization

This section focuses on understanding the patterns and insights within the data:

* **Price Trends:** Plotting high, low, open, and close prices reveals the overall price movement of Apple stock over time. We can identify periods of growth, decline, and volatility.

A graph with red and blue lines

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*Figure 4. Price Trends*

* + Observation:
    - The stock price has been on an upward trend since 2020. This reflects strong long-term growth and investor confidence in Apple's stock.
* Significant fluctuations in price levels are visible as sharp rises and declines. This period may coincide with market uncertainty, macroeconomic events, or company-specific developments.
* Another period of short-term dips occurred in mid-2023, followed by a recovery.
* The lines for High, Low, Open, and Close prices closely follow each other, suggesting relatively narrow daily price ranges
* However, during periods of high volatility, the gap between High and Low prices is more pronounced, reflecting wider trading ranges.
* **Trading Volume:** Analysis of trading volume reveals interesting patterns:
* **Volume by Year:** We can see how the total volume of Apple stock traded changes year over year.

A graph showing a number of blue bars

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*Figure 5. Total trading volume by year*

* + Observations**:**
    - 2020**:** Significantly higher trading volume, reaching approximately 40 billion. This suggests heightened market activity, likely due to:
      * The COVID-19 pandemic-driven market volatility.
      * Increased investor attention on tech stocks during lockdown periods.
    - 2021-2024**:** Trading volume shows a consistent downward trend, suggesting:
      * Stabilization in market activity.
      * Reduced trading activity relative to the 2020 peak.
* **Volume Over Time:** The plot shows periods of high and low trading activity, possibly corresponding to significant events or news.A graph showing a number of trading

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*Figure 6. Trading volume over time*

* Observations**:**
  + Trading volume spiked significantly in early 2020 but gradually declined thereafter.
  + Isolated spikes post-2024 reflect occasional high-activity days, potentially due to major market events.
  + **Volume Outliers:** We identify and highlight days with unusually high trading volume.

A graph with orange dots

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*Figure 7. Volume outliers*

A graph with blue lines and red dots

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*Figure 8. Volume outliers with dates*

* Observations:
  + - Red dots represent high-volume outliers, primarily clustered in early 2020.
    - Early 2020: Multiple spikes above 300 million in volume highlight extraordinary events.
    - After 2020, outliers become less frequent, suggesting that abnormal trading activity subsided.
    - Late 2024: Isolated outliers suggest a resurgence in market activity, possibly due to external factors like news, earnings reports, or economic events.
* **Average Closing Price**: This analysis shows:
* **Average by Year**: How the average closing price of Apple stock has trended over the years.

A graph with a line going up

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*Figure 9. Average closing price by year*

* **Observation**
  + - The average closing price showed consistent growth every year
    - Despite declining trading volumes, the steady price increase underscores strong investor demand and confidence in Apple’s performance.
* **Correlation Analysis:** This step examines the relationship between trading volume and closing price

A diagram of a scatter plot

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*Figure 10. Dataset in pandas DataFrame*