Title: Visualization of Stock Market Trends: Analyzing Volume, Price, and Volatility of Amazon Stock
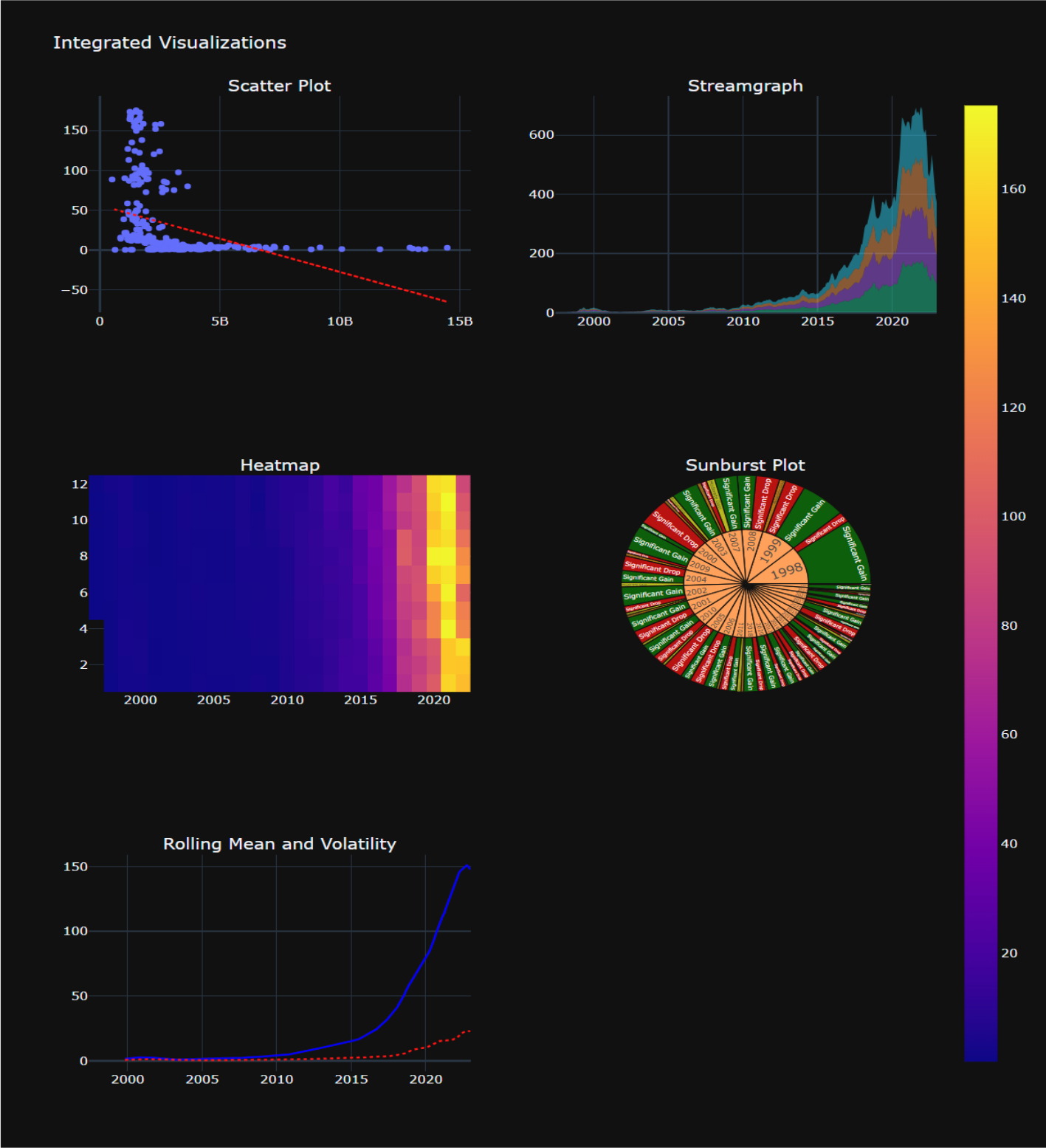
Main Figure:

The main figure should include a combination of visualizations such as a scatter plot, stacked area chart, heatmap, sunburst plot, and rolling mean/volatility plot. Ideally, these would be integrated into a single figure with smaller panels displaying each visualization. For simplicity, I will outline them as separate key visualizations:

1. **Scatter Plot:**
    o Displays the relationship between trading volume and close price.
2. **Stacked Area Chart:**
    o A simulated streamgraph representation of the open, high, low, and close prices over time.
3. **Heatmap:**
    o Displays the average close price by month and year.
4. **Sunburst Plot:**
    o Shows the correlation between price changes and trading volume, broken down by year and price change categories.
5. **Rolling Mean and Volatility Plot:**
    o Tracks the 30-day rolling mean of the closing price and the rolling volatility (price range).

Legend:
1. **Scatter Plot:**
    o Points represent the trading volume on the x-axis and closing price on the y-axis.
    o Red dashed line: regression line showing the relationship between volume and price.
    o Annotations: Show the maximum trading volume and corresponding maximum close price.
2. **Stacked Area Chart:**
    o Each trace represents a stock price component: Open, High, Low, and Close.
    o The colors are stacked to show the cumulative effect on price changes over time.
3. **Heatmap:**
    o X-axis: Year.
    o Y-axis: Month.
    o Color scale: Represents the average closing price for each month and year combination.
    o Annotations: Mark the maximum and minimum closing prices on the heatmap.
4. **Sunburst Plot:**
    o Outer circle: Represents the price change category (Significant Drop, Moderate Drop, Moderate Gain, Significant Gain).
    o Inner circle: Represents the year.
    o Size of each segment is proportional to the trading volume in that category.
5. **Rolling Mean and Volatility Plot:**
    o Blue line: Represents the 30-day rolling mean of the closing price.
    o Red dashed line: Represents the 30-day rolling volatility.
    o Annotations: Mark the date and value of the highest and lowest volatility.

Findings:
- **Scatter Plot:**
    o The relationship between trading volume and closing price appears to have a moderate positive correlation, as indicated by the regression line.
    o Maximum trading volume corresponds to a peak in closing price.
- **Stacked Area Chart:**

- The stock price shows significant fluctuations with periods where open, high, low, and close prices diverge.
- **Heatmap:**
  - The heatmap reveals trends in average closing price across months and years, with certain months consistently exhibiting higher or lower prices.
  - Maximum and minimum values are observed in specific months of each year.
- **Sunburst Plot:**
  - Most of the trading volume is clustered under the "Moderate Gain" and "Moderate Drop" categories, with significant drops occurring less frequently.
  - The volume distribution is consistent across different years, indicating stability in the price change categories.
- **Rolling Mean and Volatility Plot:**
  - The rolling mean shows a clear trend of smoothing out price fluctuations over time.
  - The rolling volatility plot highlights the periods of high volatility, useful for identifying risk and potential market trends.

Data and Method:

- **Data:**
  - The dataset consists of historical stock data for Amazon (AMZN) including columns like 'Date', 'Open', 'High', 'Low', 'Close', and 'Volume'.
  - The data is resampled by month to analyze trends on a larger time scale.
- **Method:**
  - The data was processed to create additional columns, such as the 'Price Range' (calculated as High - Low), and monthly aggregation was applied.
  - Various visualizations were created using Python libraries such as Plotly and Pandas, with analysis done through scatter plots, heatmaps, and rolling mean/volatility analysis.
  - The sunburst plot and stacked area chart were designed to offer interactive insights into price changes and trading volume over time.

Significance:

- The ability to visualize stock market data provides crucial insights into the dynamics between trading volume and stock price changes. These visualizations allow investors and analysts to quickly identify patterns, volatility, and correlations that can inform investment strategies.
- The rolling mean and volatility analysis is particularly useful for understanding the stability of the stock and predicting future price movements. Similarly, the sunburst plot offers an easy way to observe trends and patterns in price categories across years.
- The heatmap highlights seasonal trends in stock price behavior, helping identify periods of higher risk or opportunity.
- Overall, this analysis contributes valuable tools for assessing stock performance and market conditions.

GitHub Repository:
https://github.com/hithaishree98/InformationVisualization.git