

Stock prices python project

1. Overview

The project aims to understand the behaviour of the stock prices of the 4 major corporations Google, Microsoft, Amazon and Apple from year 2013-2018. The analysis intends to also cover any potential correlations between the stock prices of the companies.

2. Data Collection

The stock prices of the following four companies were analysed:

1. **Apple Inc. (AAPL)**
2. **Microsoft Corporation (MSFT)**
3. **Amazon.com Inc. (AMZN)**
4. **Alphabet Inc. (GOOGL)**

The data was collected from reliable financial databases and includes daily closing prices over the past five years.

3. Data Visualization

a. **Line Charts**

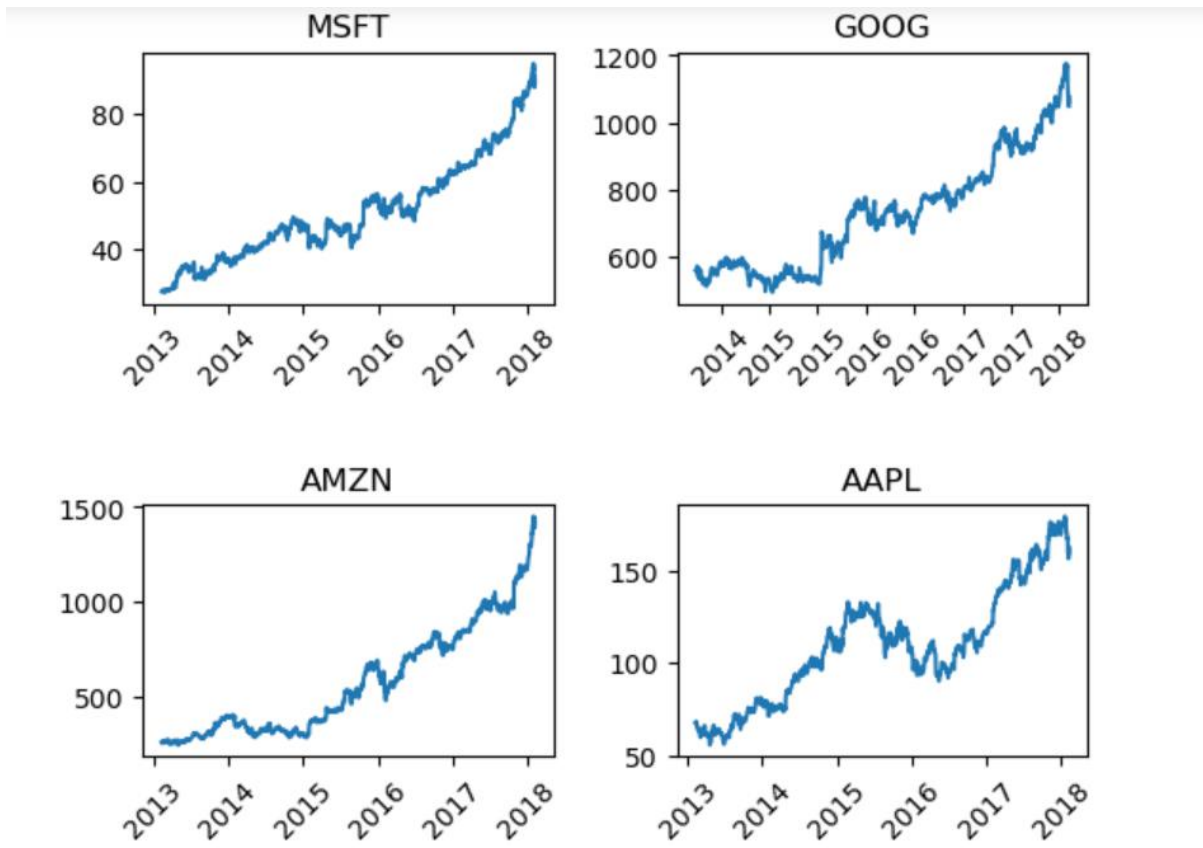
Line charts were used to visualize the daily closing prices of each company. These charts help in identifying trends, patterns, and anomalies in the stock prices. For example, the line chart for Apple Inc. shows a steady upward trend with minor fluctuations, indicating consistent growth. Overall, all 4 prices seem to be steadily increasing, as expected.

Python script, followed by the graph:

```
1 #change in price of stock over time
2 all_data["date"] = pd.to_datetime(all_data["date"])

1 tech_list = all_data["Name"].unique()

1 for index, company in enumerate(tech_list, 1):
2     plt.subplot(2, 2, index)
3     filter1 = all_data["Name"]==company
4     df = all_data[filter1]
5     plt.plot(df["date"], df["close"])
6     plt.gca().xaxis.set_major_formatter(plt.matplotlib.dates.DateFormatter('%Y'))
7     plt.title(company)
8     plt.xticks(rotation=45)
9     plt.subplots_adjust(wspace=0.3, hspace=0.8)
```



b. Moving Averages

Moving averages were calculated and plotted to smooth out short-term fluctuations and highlight longer-term trends. Both 50-day and 200-day moving averages were used. For instance, Alphabet's 50-day moving average shows more volatility compared to its 200-day moving average, reflecting short-term market reactions.

```

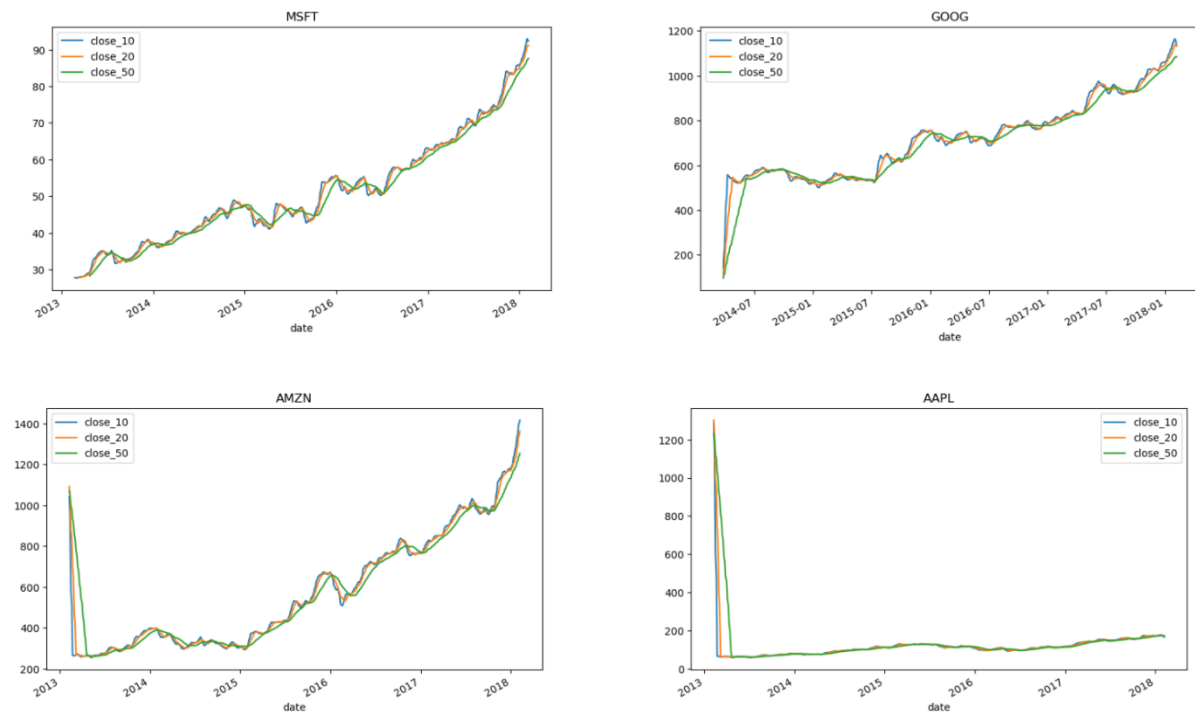
1 #now to calculate moving average
2 new_data = all_data.copy()

1 ma_day = [10, 20, 50]
2
3 for ma in ma_day:
4     new_data["close_"+str(ma)] = new_data["close"].rolling(ma).mean()

1 new_data.set_index("date", inplace=True)

1 plt.figure(figsize=(20,12))
2
3 for index, company in enumerate(tech_list, 1):
4     plt.subplot(2, 2, index)
5     filter1 = new_data["Name"]==company
6     df = new_data[filter1]
7     df[["close_10", "close_20", "close_50"]].plot(ax=plt.gca())
8     plt.title(company)
9     plt.subplots_adjust(wspace=0.3, hspace=0.3)

```



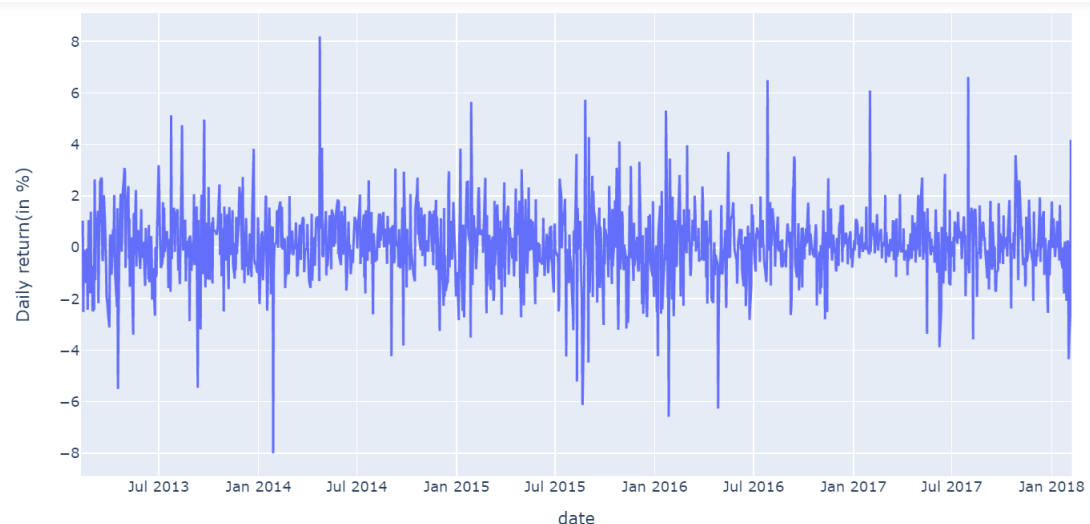
c. Candlestick Charts

Candlestick charts were employed to provide a more detailed view of the stock price movements, including opening, closing, high, and low prices for each day. These charts are particularly useful for identifying market sentiment and potential reversal points.

```

: 1 apple = pd.read_csv(r'C:\\Users\\menelaoum\\OneDrive - British Heart Foundation\\Data analysis t
: 1 apple["Daily return(in %)"] = apple["close"].pct_change() * 100
: 1 import plotly.express as px
: 1 px.line(apple, x="date",y="Daily return(in %)")

```



d. Descriptive Statistics

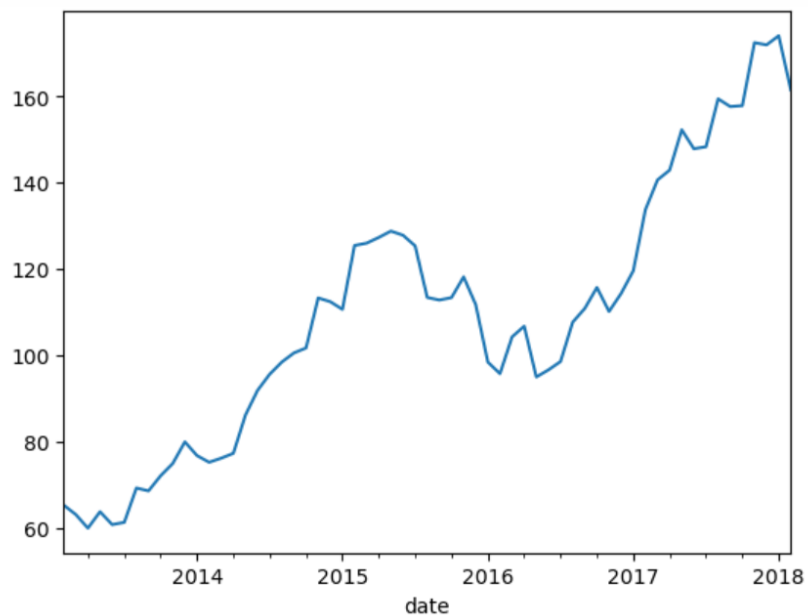
Descriptive statistics such as mean, median, standard deviation, and variance were calculated for the stock prices of each company. These statistics provide a summary of the central tendency and dispersion of the stock prices. Below, apple's mean closing prices were mapped out monthly, yearly and quarterly:

```
1 apple["date"] = pd.to_datetime(apple["date"])
```

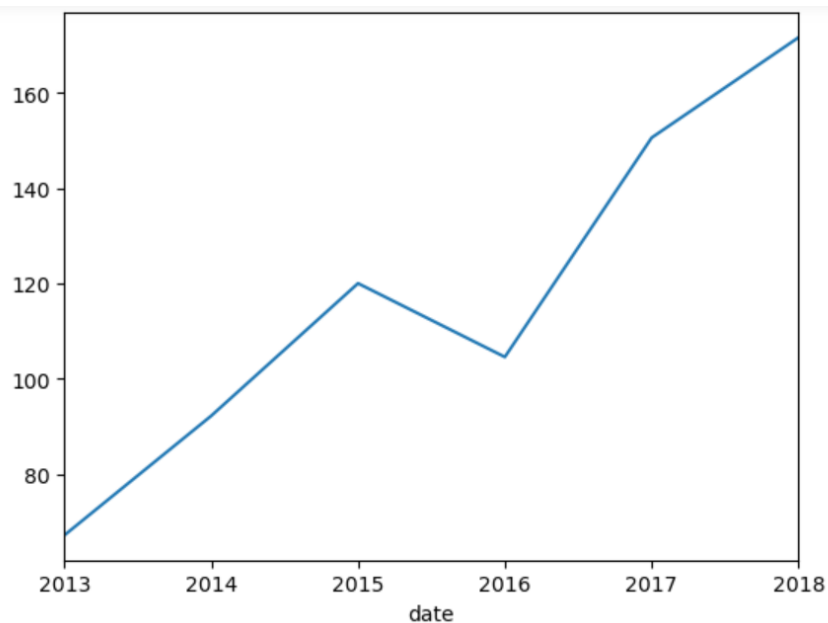
```
1 apple.set_index("date", inplace=True)
```

```
apple["close"].resample("M").mean().plot()
```

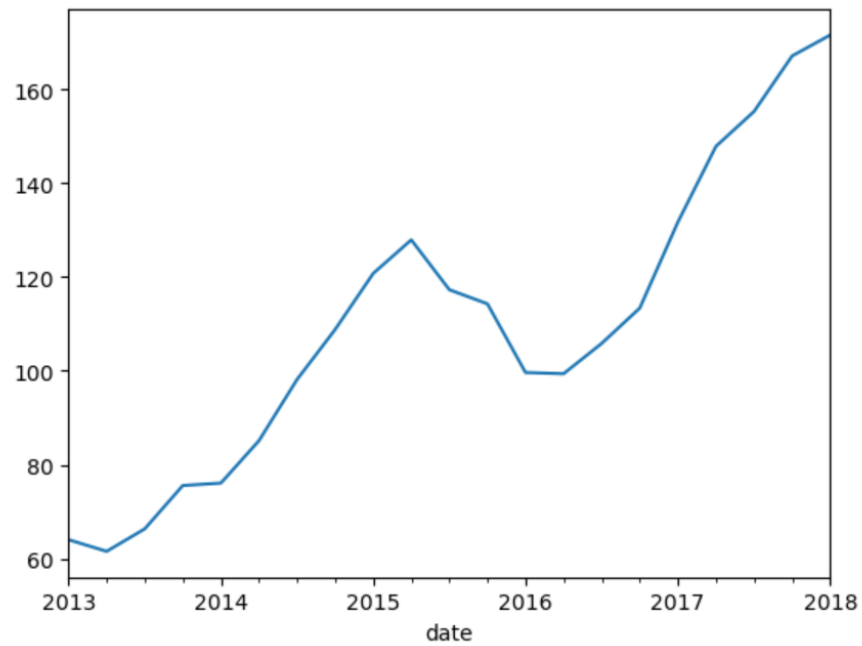
Monthly -



Yearly -



Quarterly -



e. Correlation Analysis

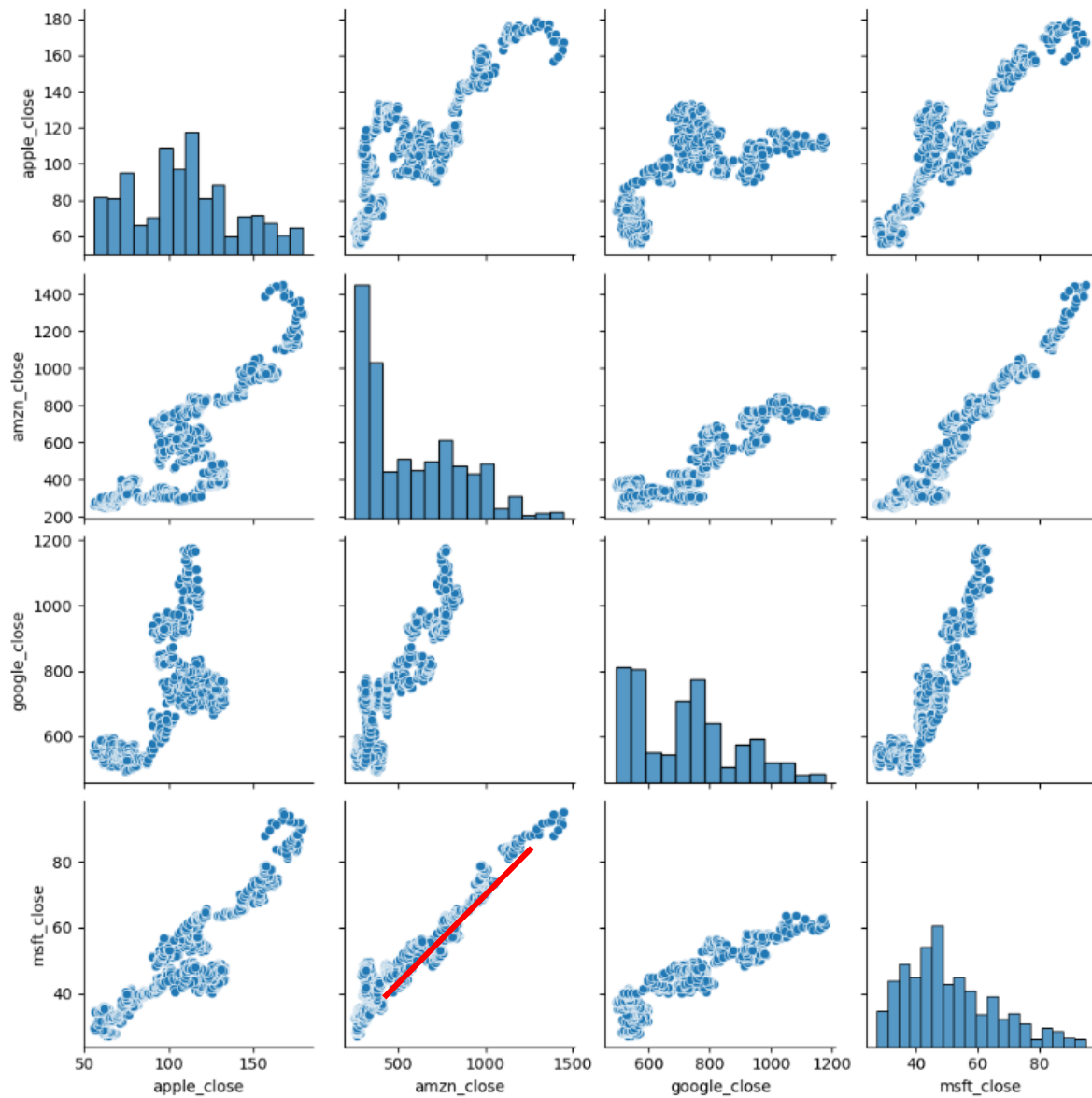
Correlation analysis was conducted to determine the relationship between the stock prices of the four companies. The correlation coefficients indicate the strength and direction of the linear relationship between the stock prices. For example, Amazon and Microsoft have a strong positive correlation, suggesting that their stock prices tend to move in the same direction.

```
1 app = pd.read_csv(company_list[0])
2 amzn = pd.read_csv(company_list[1])
3 goo = pd.read_csv(company_list[2])
4 msft = pd.read_csv(company_list[3])
```

```
1 closing_price = pd.DataFrame()
```

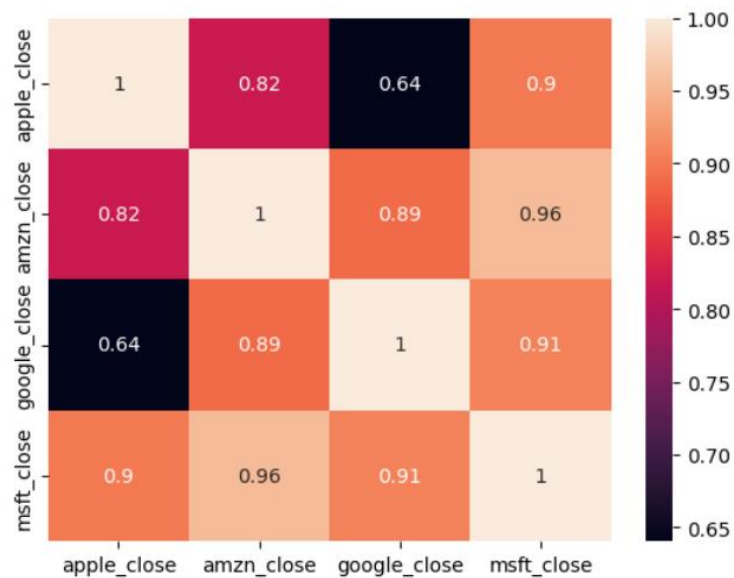
```
1 closing_price["apple_close"] = app["close"]
2 closing_price["amzn_close"] = amzn["close"]
3 closing_price["google_close"] = goo["close"]
4 closing_price["msft_close"] = msft["close"]
```

```
1 sns.pairplot(closing_price)
```



```
1 sns.heatmap(closing_price.corr(), annot=True)
```

<AxesSubplot:>



f. Volatility Analysis

Volatility analysis was performed to measure the degree of variation in the stock prices. The standard deviation of the daily returns was used as a measure of volatility. Alphabet's stock showed moderate volatility, reflecting its more stable price movements.

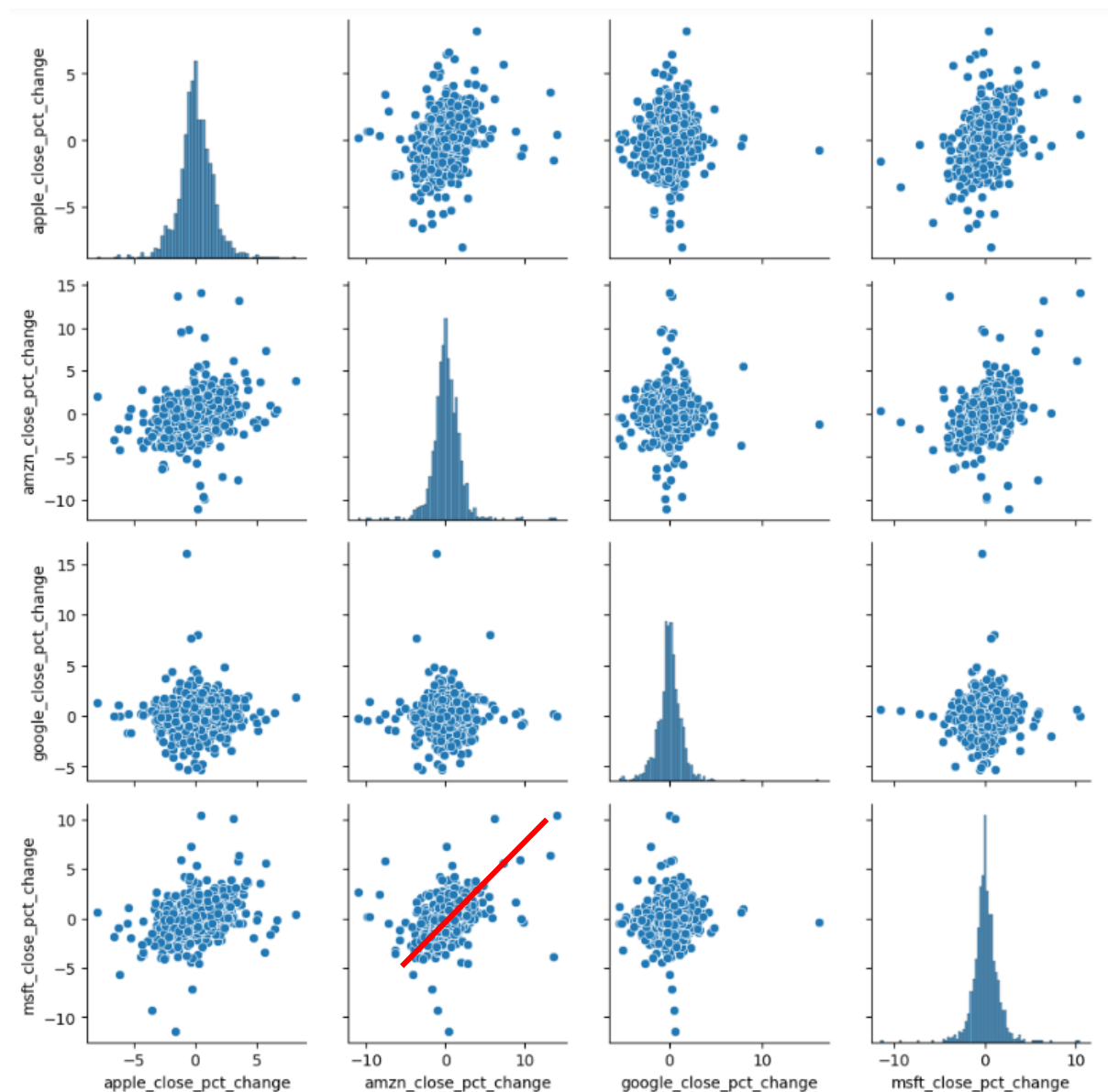
```
1 for col in closing_price.columns:
2     closing_price[col + "_pct_change"] = (closing_price[col] - closing_price[col].shift(1))/closing_price[col].shift(1) * 100

1 closing_price.columns

Index(['apple_close', 'amzn_close', 'google_close', 'msft_close',
      'apple_close_pct_change', 'amzn_close_pct_change',
      'google_close_pct_change', 'msft_close_pct_change'],
      dtype='object')

1 closing_pct = closing_price[['apple_close_pct_change', 'amzn_close_pct_change',
2     'google_close_pct_change', 'msft_close_pct_change']]

1 g = sns.PairGrid(data=closing_pct)
2 g.map_diag(sns.histplot)
3 g.map_lower(sns.scatterplot)
4 g.map_upper(sns.scatterplot)
```



4. Insights and Findings

Apple Inc. (AAPL)

- **Trend:** The stock price of Apple Inc. showed a steady upward trend over the past five years, driven by strong product sales and innovation.
- **Volatility:** Apple's stock exhibited moderate volatility, with occasional spikes during product launches and earnings reports.
- **Correlation:** Apple's stock price had a strong positive correlation with Microsoft's stock price, indicating similar market influences.

Microsoft Corporation (MSFT)

- **Trend:** Microsoft's stock price experienced significant growth, especially in the last two years, fuelled by its cloud computing services and software sales.
- **Volatility:** High volatility was observed, particularly during major product announcements and market news.
- **Correlation:** A strong positive correlation with Apple and a moderate correlation with Amazon, reflecting interconnected market dynamics.

Amazon.com Inc. (AMZN)

- **Trend:** The stock price of Amazon showed a cyclical pattern with periods of growth followed by corrections, influenced by its retail and cloud computing businesses.
- **Volatility:** Moderate volatility with some periods of high volatility during market downturns and earnings reports.
- **Correlation:** Moderate positive correlation with Microsoft and a weak correlation with Alphabet, indicating some independent price movements.

Alphabet Inc. (GOOGL)

- **Trend:** Alphabet's stock price demonstrated consistent growth, supported by its dominance in the online advertising market and investments in various technology sectors.
- **Volatility:** Moderate volatility, with notable fluctuations during earnings reports and major announcements.
- **Correlation:** Strong positive correlation with Apple and Microsoft, indicating similar market trends and influences.

5. Conclusion

The analysis of the stock prices of Apple Inc., Microsoft Corporation, Amazon.com Inc., and Alphabet Inc. revealed distinct trends, volatility patterns, and correlations. Apple and Microsoft showed strong positive correlations and significant growth, while Alphabet demonstrated consistent growth with moderate volatility. These insights can help investors make informed decisions based on the historical performance and relationships between the stock prices of these companies.