Stock Market Performance Analysis using Python

Stock Market Performance Analysis involves calculating moving averages, measuring volatility, conducting correlation analysis and analyzing various aspects of the stock market to gain a deeper understanding of the factors that affect stock prices and the relationships between the stock prices of different companies.

overview

```
# importing necessary libraries
import pandas as pd
from scipy import stats
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
import plotly.express as px
from datetime import datetime
import yfinance as yf
import plotly.graph_objects as go

#Now below is how we can collect real-time stock market data using the 
yfinance API:
start_date=datetime.now()-pd.DateOffset(months=3)
end_date=datetime.now()

stockss = ['AAPL', 'MSFT', 'NFLX', 'GOOG']

df_list = []

for stock in stockss:
    data = yf.download(stock, start=start_date, end=end_date)
    df_list.append(data)

df = pd.concat(df_list, keys=stockss, names=['stock', 'date'])
print(df.head())
```

```
[*********************100%%**********************]  1 of 1 completed
[*********************100%%**********************]  1 of 1 completed
[*********************100%%**********************]  1 of 1 completed
[*********************100%%**********************]  1 of 1 completed
                        Open        High         Low       Close   Adj 
Close  \
stock date                                                              

AAPL  2023-06-06  179.970001  180.119995  177.429993  179.210007
```

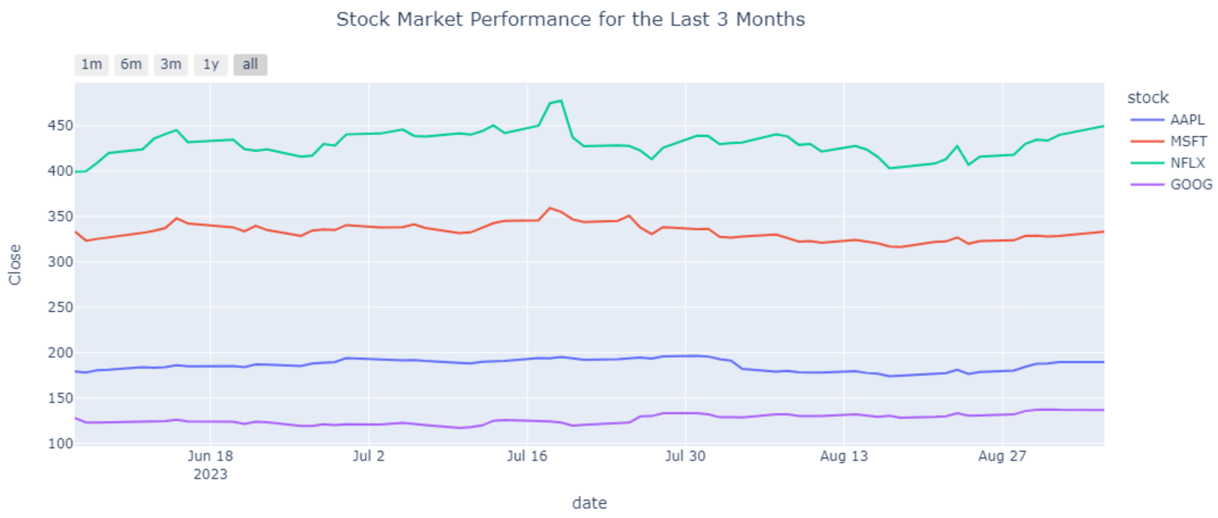
```
178.968338
      2023-06-07  178.440002  181.210007  177.320007  177.820007
177.580200
      2023-06-08  177.899994  180.839996  177.460007  180.570007
180.326492
      2023-06-09  181.500000  182.229996  180.630005  180.960007
180.715973
      2023-06-12  181.270004  183.889999  180.970001  183.789993
183.542145

                    Volume
stock date
AAPL  2023-06-06  64848400
      2023-06-07  61944600
      2023-06-08  50214900
      2023-06-09  48870700
      2023-06-12  54274900
```

```
df.reset_index(inplace=True)
df
```

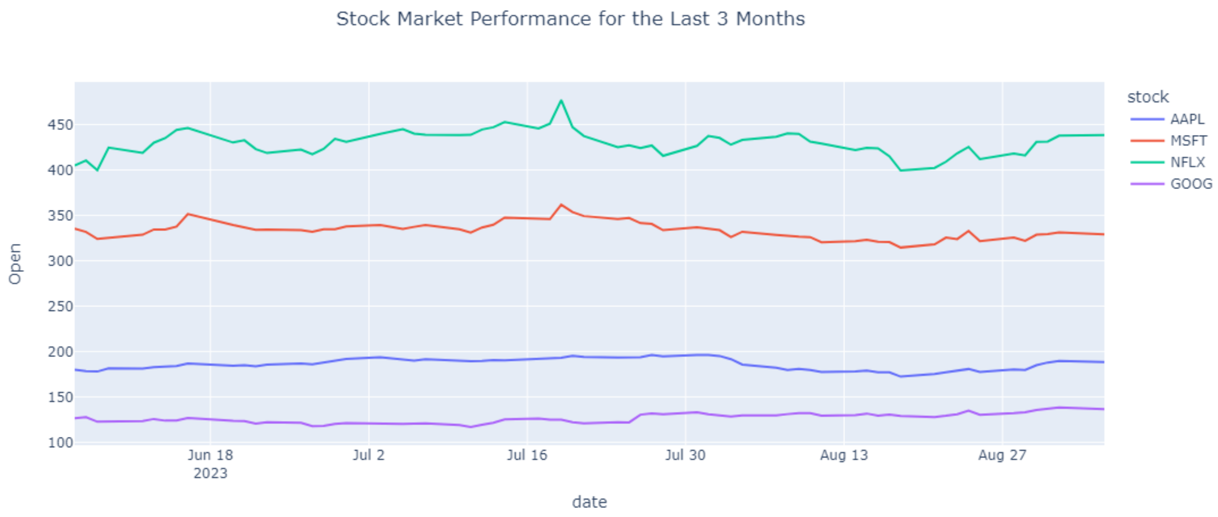
```
    stock        date        Open        High         Low
Close  \
0    AAPL 2023-06-06  179.970001  180.119995  177.429993  179.210007

1    AAPL 2023-06-07  178.440002  181.210007  177.320007  177.820007

2    AAPL 2023-06-08  177.899994  180.839996  177.460007  180.570007

3    AAPL 2023-06-09  181.500000  182.229996  180.630005  180.960007

4    AAPL 2023-06-12  181.270004  183.889999  180.970001  183.789993

..    ...         ...         ...         ...         ...         ...

247  GOOG 2023-08-29  132.998001  137.294998  132.979996  135.490005

248  GOOG 2023-08-30  135.570007  137.250000  135.020996  136.929993

249  GOOG 2023-08-31  137.050003  138.399994  136.820007  137.350006

250  GOOG 2023-09-01  138.429993  138.580002  135.940002  136.800003

251  GOOG 2023-09-05  136.440002  136.955002  135.559998  136.449997


      Adj Close    Volume
0    178.968338  64848400
1    177.580200  61944600
2    180.326492  50214900
3    180.715973  48870700
```

```
4    183.542145  54274900
..          ...       ...
247  135.490005  30803300
248  136.929993  21773400
249  137.350006  28147900
250  136.800003  16665700
251  136.449997  10690026

[252 rows x 8 columns]
```

```
# now we will loook and compare the performance of these shares  for
this comparison we will use aline chart
# performance measure via stock closing
fig = px.line(df, x='date',
              y='Close',
              color='stock',
              title="Stock Market Performance for the Last 3 Months")
fig.update_layout(title_x=0.47,height=500,width=800)
fig.update_xaxes(
    rangeselector=dict(
        buttons=list([
            dict(count=1, label="1m", step="month",
stepmode="backward"),
            dict(count=6, label="6m", step="month",
stepmode="backward"),
            dict(count=3, label="3m", step="month",
stepmode="backward"),
            dict(count=1, label="1y", step="year",
stepmode="backward"),
            dict(step="all")
        ])
    )
)

fig.show()
```

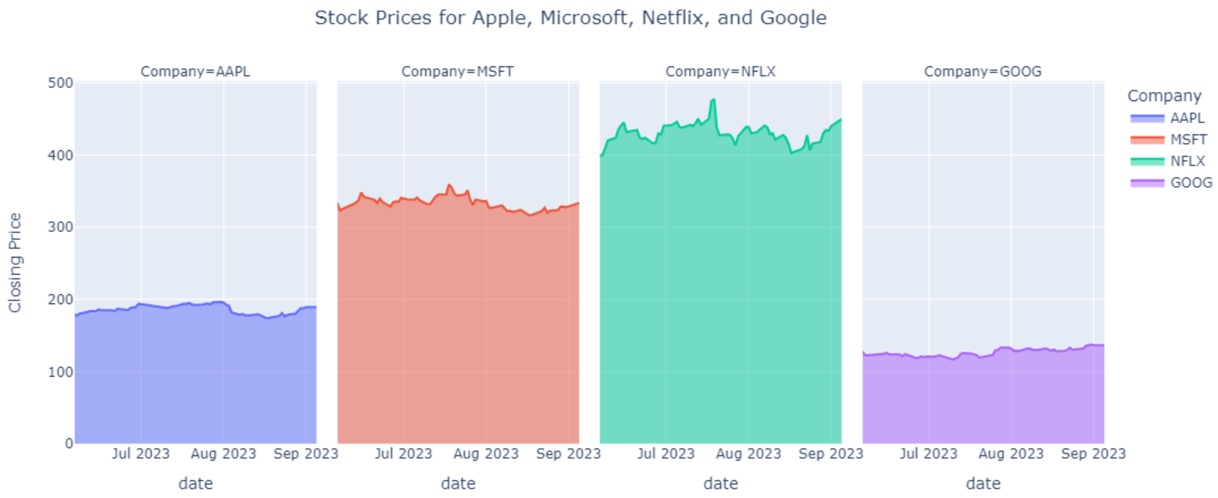


```
# performance measure via stock opening
fig = px.line(df, x='date',
              y='Open',
              color='stock',
              title="Stock Market Performance for the Last 3 Months")
fig.update_layout(title_x=0.47,height=500,width=800)
fig.show()
```



Now let’s look at the faceted area chart, which makes it easy to compare the performance of different companies and identify similarities or differences in their stock price movements:

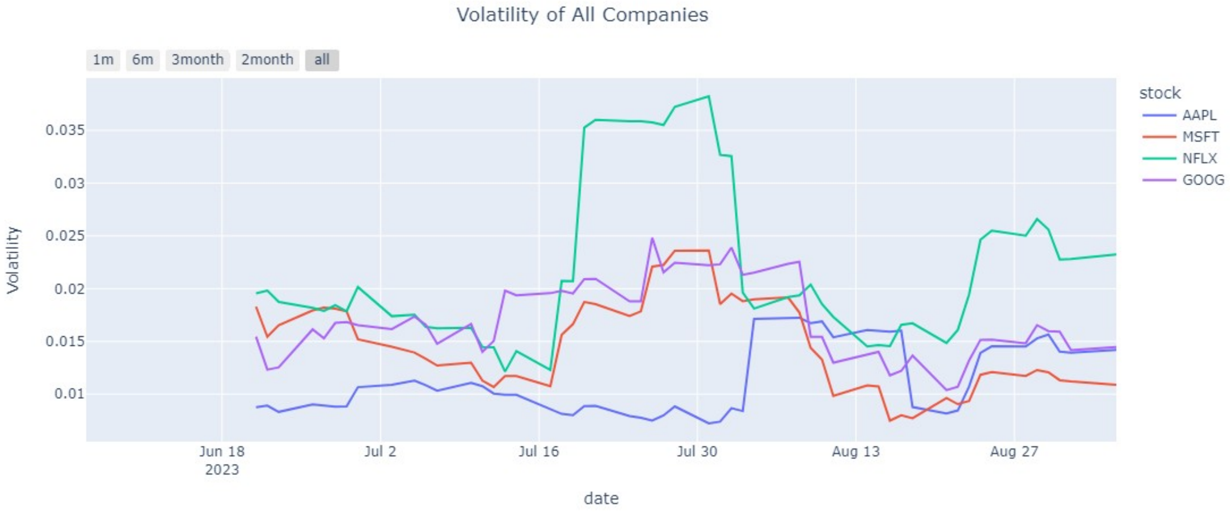
```
fig = px.area(df, x='date', y='Close', color='stock',
              facet_col='stock',
              labels={'date':'date', 'Close':'Closing Price',
'stock':'Company'},
              title='Stock Prices for Apple, Microsoft, Netflix, and
Google')
fig.update_layout(title_x=0.47,height=500)
fig.show()
```



Let us now analyze the volatility of all companies. Volatility is a measure of how much and how often the stock price or market fluctuates over a given period of time.

Here’s how to visualize the volatility of all companies:

```
df['Volatility'] = df.groupby('stock')
['Close'].pct_change().rolling(window=10).std().reset_index(0,
drop=True)
fig = px.line(df, x='date', y='Volatility',
              color='stock',
              title='Volatility of All Companies')
fig.update_layout(title_x=0.47,height=500)
fig.update_xaxes(
    rangeselector=dict(
        buttons=list([
            dict(count=1, label="1m", step="month",
stepmode="backward"),
            dict(count=6, label="6m", step="month",
stepmode="backward"),
            dict(count=3, label="3month", step="month",
stepmode="backward"),
            dict(count=1, label="2month", step="month",
stepmode="backward"),
            dict(step="all")
        ])
    )
)
fig.show()
```

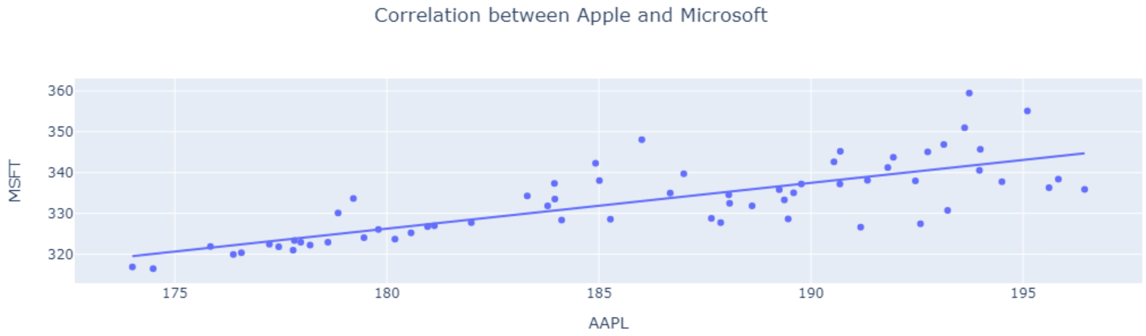


#High volatility indicates that the stock or market experiences large and frequent price movements, while low volatility indicates that the market experiences smaller or less frequent price movements.

Now let’s analyze the correlation between the stock prices of Apple and Microsoft: for that we will look at the datset first

```
df.head() # as we want to see the data of apple and microsft there
fore we will segregate that data from the original data

  stock        date        Open        High         Low       Close  \
0  AAPL 2023-06-06  179.970001  180.119995  177.429993  179.210007
1  AAPL 2023-06-07  178.440002  181.210007  177.320007  177.820007
2  AAPL 2023-06-08  177.899994  180.839996  177.460007  180.570007
3  AAPL 2023-06-09  181.500000  182.229996  180.630005  180.960007
4  AAPL 2023-06-12  181.270004  183.889999  180.970001  183.789993

    Adj Close    Volume  Volatility
```

```
0  178.968338  64848400        NaN
1  177.580200  61944600        NaN
2  180.326492  50214900        NaN
3  180.715973  48870700        NaN
4  183.542145  54274900        NaN

#create a DataFrame with the stock prices of Apple and Microsoft
apple = df.loc[df['stock'] == 'AAPL', ['date',
'Close']].rename(columns={'Close': 'AAPL'})
microsoft = df.loc[df['stock'] == 'MSFT', ['date',
'Close']].rename(columns={'Close': 'MSFT'})
df_corr = pd.merge(apple, microsoft, on='date')

# create a scatter plot to visualize the correlation
fig = px.scatter(df_corr, x='AAPL', y='MSFT', trendline="ols",
                 title='Correlation between Apple and Microsoft')
fig.update_layout(title_x=0.47)
fig.show()
```



```
apple = df.loc[df['stock'] == 'AAPL', ['date', 'Close']]
apple.rename(columns={'Close':'AAPL'})

          date        AAPL
0   2023-06-06  179.210007
1   2023-06-07  177.820007
2   2023-06-08  180.570007
3   2023-06-09  180.960007
4   2023-06-12  183.789993
..         ...         ...
58  2023-08-29  184.119995
59  2023-08-30  187.649994
60  2023-08-31  187.869995
61  2023-09-01  189.460007
62  2023-09-05  189.369995

[63 rows x 2 columns]
```

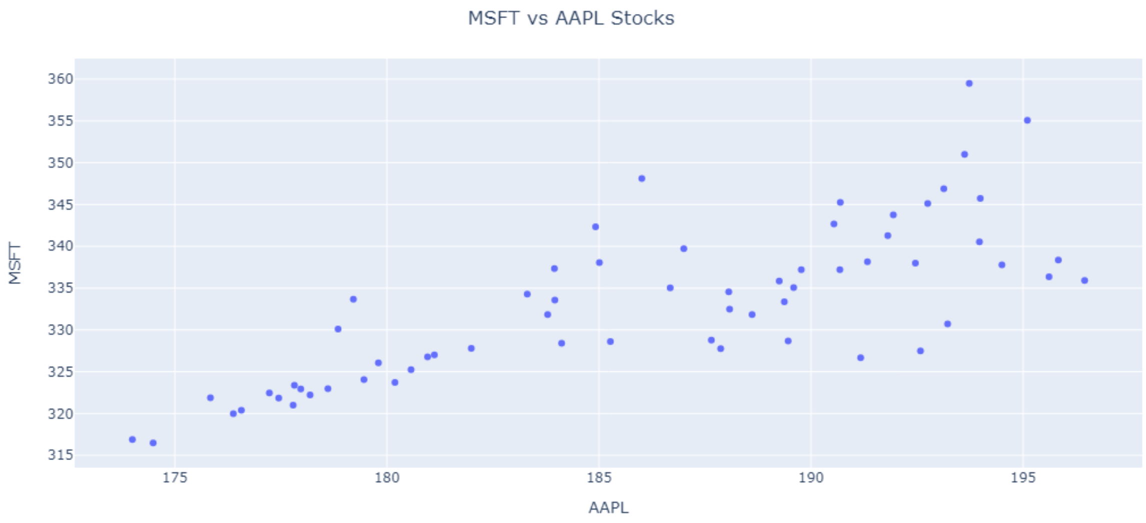
```
microsoft = df.loc[df['stock'] == 'MSFT', ['date', 'Close']]
microsoft=microsoft.rename(columns={'Close':'MSFT'})
microsoft
```

```
           date        MSFT
63   2023-06-06  333.679993
64   2023-06-07  323.380005
65   2023-06-08  325.260010
66   2023-06-09  326.790009
67   2023-06-12  331.850006
..          ...         ...
121  2023-08-29  328.410004
122  2023-08-30  328.790009
123  2023-08-31  327.760010
124  2023-09-01  328.660004
125  2023-09-05  333.349609

[63 rows x 2 columns]
```

```
df_corr = pd.merge(apple, microsoft, on='date') # conactening both
dataframes in one for further analysis

df_corr=df_corr.rename(columns={"Close":"AAPL"}) # renaming column
df_corr.head(2)
```

```
         date        AAPL        MSFT
0 2023-06-06  179.210007  333.679993
1 2023-06-07  177.820007  323.380005
```

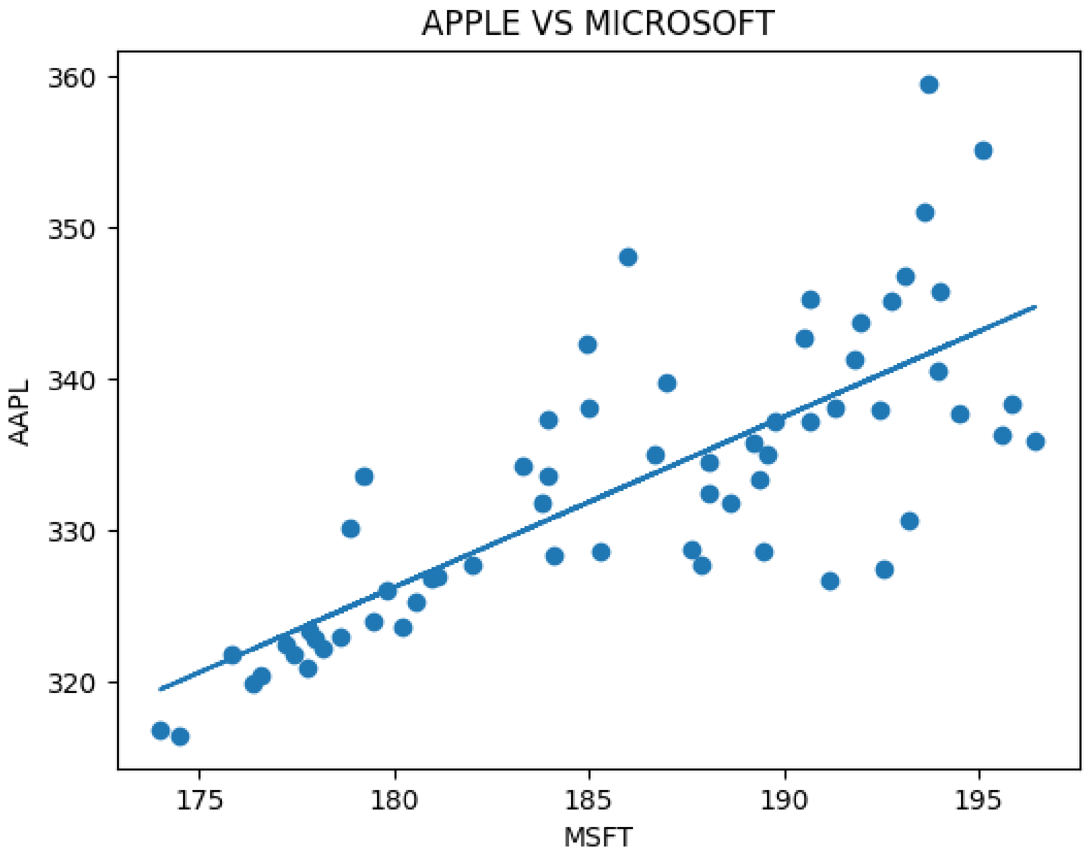
```
import scipy
from scipy import stats

# create a scatter plot to visualize the correlation
# create a scatter plot to visualize the correlation
fig = px.scatter(df_corr, x='AAPL', y='MSFT')
fig.update_layout(title="MSFT vs AAPL
Stocks",title_x=0.47,height=500,width=700)
fig.show()
# I tried to plot trendline but somehow its not available i mean not
working , as we cann see there is a realtion between the shares
#of micrsoft and apple therefore we will try to plot a linear model in
it and lets check whether we will be able to apply simple machine
learning model
```



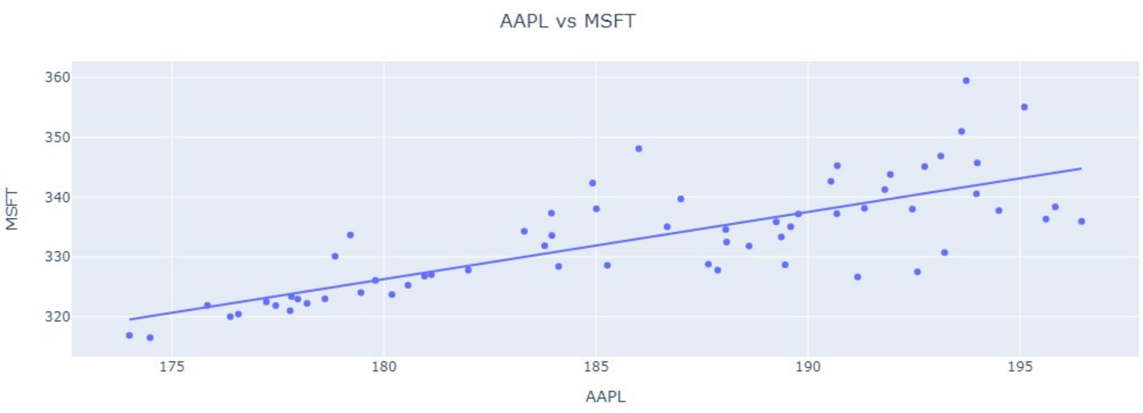
```
x=df_corr.AAPL
y=df_corr.MSFT
slope, intercept, r, p, std_err = stats.linregress(x, y)
print(r)
```

```
0.7731032741833702
```

```
def myfunc(x):
  return slope * x + intercept

mymodel = list(map(myfunc, x))

plt.scatter(x, y)
plt.plot(x, mymodel)
plt.xlabel("MSFT")
plt.ylabel("AAPL")
plt.title("APPLE VS MICROSOFT")
plt.show()
# used matplotlib library for plotting the trendline as in plotly my
its not working even after fixing it a lot
```



```
#lets try to predict the THE VALUE WITH THIS MODEL
AAPL=myfunc(180.96)
AAPL
# lets checkout these results via the scatter plot below in plotly

327.3373598063186

fig = px.scatter(df_corr, x='AAPL', y='MSFT',trendline="ols")
fig.update_layout(height=400,width=700,title="AAPL vs
MSFT",title_x=0.47)
fig.show()
```



now we will plot the correlation between stocks of microsft and netflix too

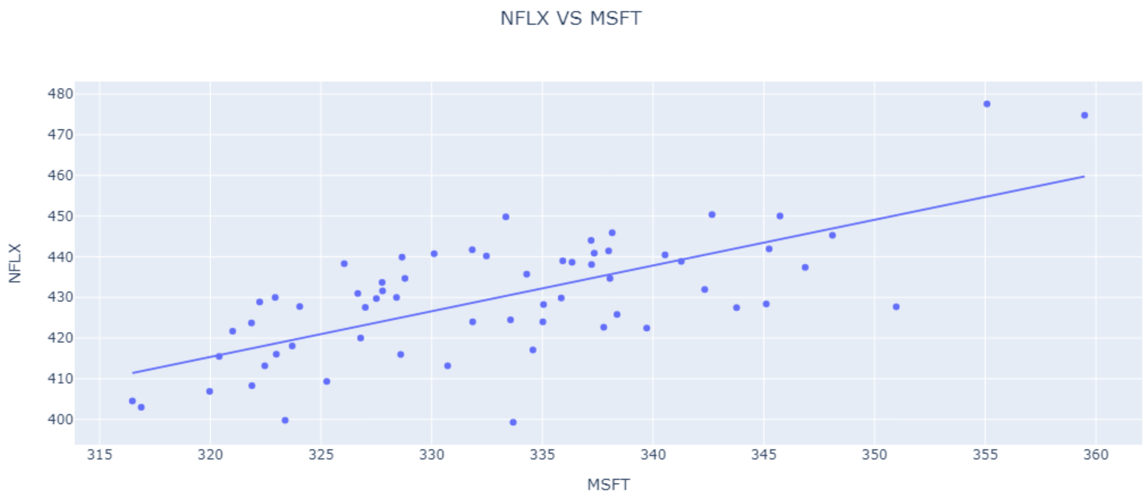
```
netflix = df.loc[df['stock'] == 'NFLX', ['date', 'Close']]
netflix=netflix.rename(columns={'Close':'NFLX'})
netflix
```

```
           date        NFLX
126  2023-06-06  399.290009
127  2023-06-07  399.769989
128  2023-06-08  409.369995
129  2023-06-09  420.019989
130  2023-06-12  423.970001
..          ...         ...
184  2023-08-29  429.989990
185  2023-08-30  434.670013
186  2023-08-31  433.679993
187  2023-09-01  439.880005
188  2023-09-05  449.820007

[63 rows x 2 columns]
```

```
corr = pd.merge(microsoft,netflix, on='date')
corr
```

```
          date        MSFT        NFLX
0   2023-06-06  333.679993  399.290009
1   2023-06-07  323.380005  399.769989
2   2023-06-08  325.260010  409.369995
3   2023-06-09  326.790009  420.019989
4   2023-06-12  331.850006  423.970001
..         ...         ...         ...
58  2023-08-29  328.410004  429.989990
59  2023-08-30  328.790009  434.670013
```

```
60 2023-08-31  327.760010  433.679993
61 2023-09-01  328.660004  439.880005
62 2023-09-05  333.349609  449.820007

[63 rows x 3 columns]

#plotting a scatter plot for below visualization
fig = px.scatter(corr, y='NFLX',
x='MSFT',height=500,width=700,title="NFLX VS MSFT",trendline="ols")
fig.update_layout(title_x=0.47)
fig.show()
```



```
x=corr.NFLX
y=corr.MSFT
slope, intercept, r, p, std_err = stats.linregress(x, y)
r

0.6935528587828999
```

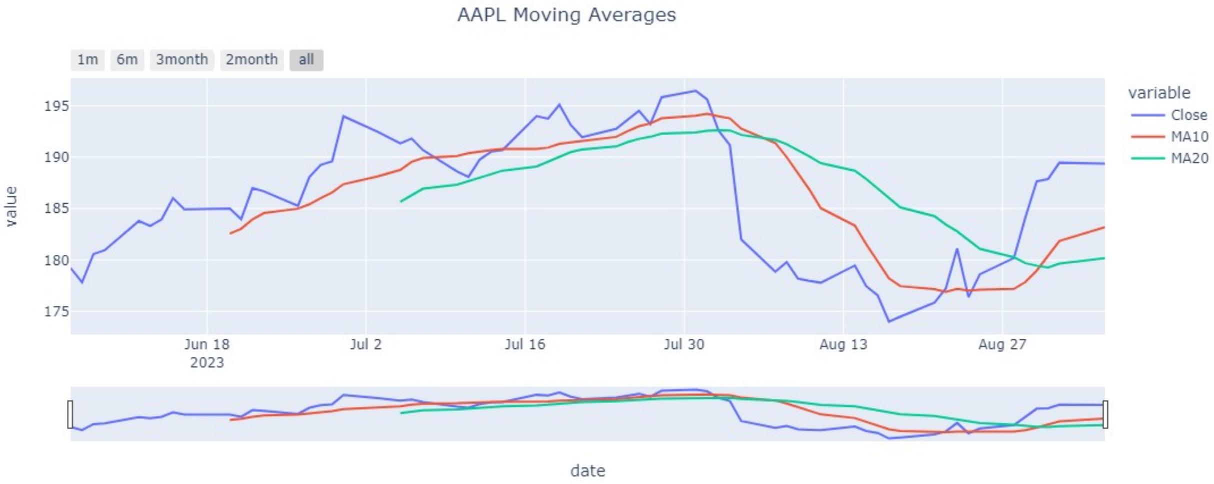
since there calculated value of coefficient of correlation is >)>^ hence we can say there is a strong linear relationship between these two shares too..

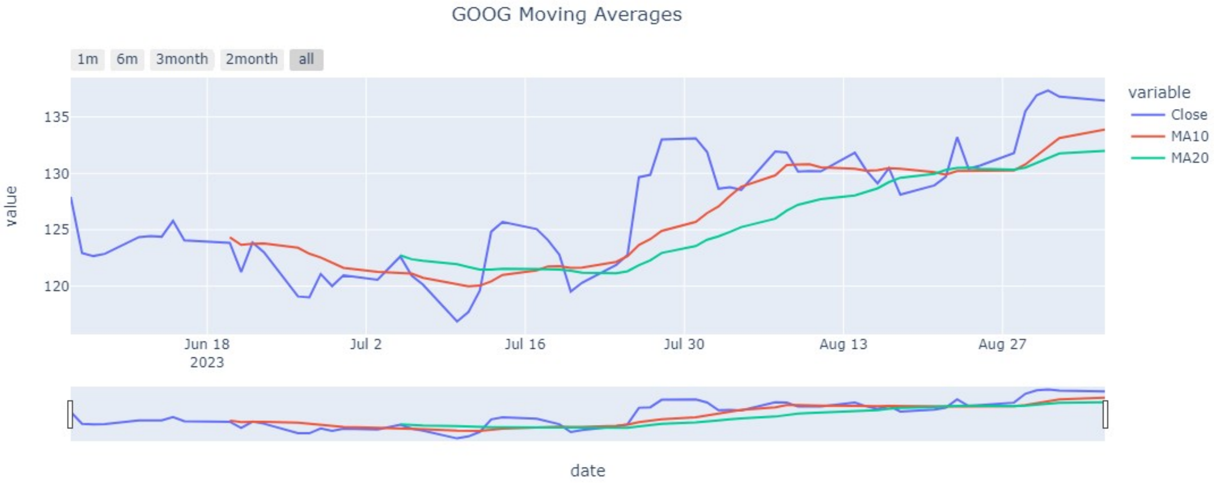
Now let’s analyze moving averages, which provide a useful way to identify trends and patterns in each company’s stock price movements over a period time

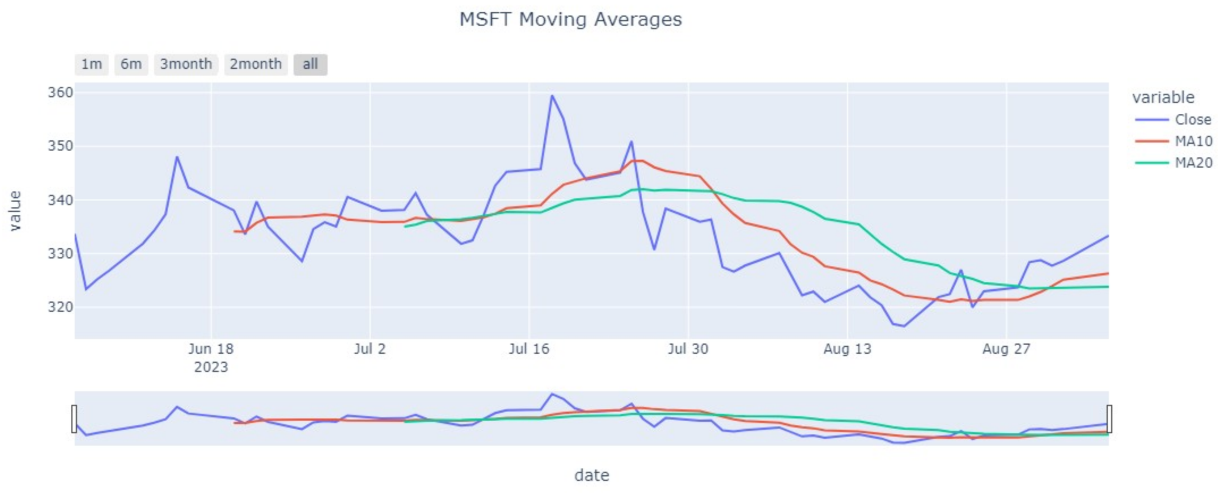
```
df['MA10'] = df.groupby('stock')
['Close'].rolling(window=10).mean().reset_index(0, drop=True)
df['MA20'] = df.groupby('stock')
['Close'].rolling(window=20).mean().reset_index(0, drop=True)

for stock, group in df.groupby('stock'):
    print(f'Moving Averages for {stock}')
    print(group[['MA10', 'MA20']])
```

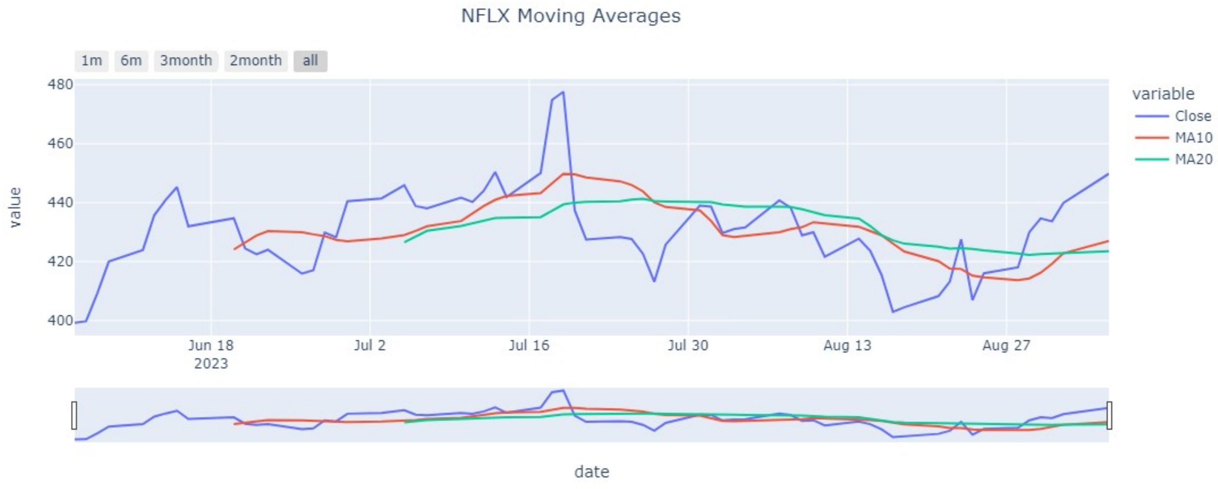
```
Moving Averages for AAPL
          MA10        MA20
0          NaN         NaN
1          NaN         NaN
2          NaN         NaN
3          NaN         NaN
4          NaN         NaN
..         ...         ...
58  177.855000  179.690001
59  178.962999  179.443501
60  180.349998  179.278500
61  181.846999  179.652000
62  183.199998  180.178000

[63 rows x 2 columns]
Moving Averages for GOOG
           MA10        MA20
189         NaN         NaN
190         NaN         NaN
191         NaN         NaN
192         NaN         NaN
193         NaN         NaN
..          ...         ...
247  130.790001  130.513000
248  131.572000  130.927500
249  132.261000  131.356500
250  133.130000  131.769501
251  133.882001  131.995000

[63 rows x 2 columns]
Moving Averages for MSFT
           MA10        MA20
63          NaN         NaN
```

```
64          NaN         NaN
65          NaN         NaN
66          NaN         NaN
67          NaN         NaN
..          ...         ...
121  322.016003  323.516501
122  322.855005  323.581001
123  323.943005  323.636002
124  325.161005  323.680002
125  326.307965  323.841983

[63 rows x 2 columns]
Moving Averages for NFLX
           MA10        MA20
126         NaN         NaN
127         NaN         NaN
128         NaN         NaN
129         NaN         NaN
130         NaN         NaN
..          ...         ...
184  414.300000  422.319002
185  416.222000  422.567502
186  419.289999  422.701501
187  422.825000  423.115501
188  426.978000  423.568501

[63 rows x 2 columns]

#Now here's how to visualize the moving averages of all companies:

for stock,group in df.groupby('stock'):

    fig = px.line(group, x='date', y=['Close', 'MA10', 'MA20'],

                  title=f"{stock} Moving Averages")
    fig.update_layout(title_x=0.47,height=500,width=900)

    fig.update_xaxes(rangeslider_visible=True)
    fig.update_xaxes(
    rangeselector=dict(
        buttons=list([
            dict(count=1, label="1m", step="month",
stepmode="backward"),
            dict(count=6, label="6m", step="month",
stepmode="backward"),
            dict(count=3, label="3month", step="month",
stepmode="backward"),
            dict(count=1, label="2month", step="month",
stepmode="backward"),
            dict(step="all")
            ])
        )
)

    fig.show()
```


AAPL Moving Averages
1m
6m
3month
2month
all
value
195
190
185
180
175
Jun 18
2023
Jul 2
Jul 16
Jul 30
Aug 13
Aug 27
date
variable
Close
MA10
MA20


GOOG Moving Averages
1m
6m
3month
2month
all
value
135
130
125
120
Jun 18
2023
Jul 2
Jul 16
Jul 30
Aug 13
Aug 27
date
variable
Close
MA10
MA20





The output shows four separate graphs for each company. When the MA10 crosses above the MA20, it is considered a bullish signal indicating that the stock price will continue to rise. Conversely, when the MA10 crosses below the MA20, it is a bearish signal that the stock price will continue falling.

lastly we will see the volume of stock traded via stocks

```
df.head()
```

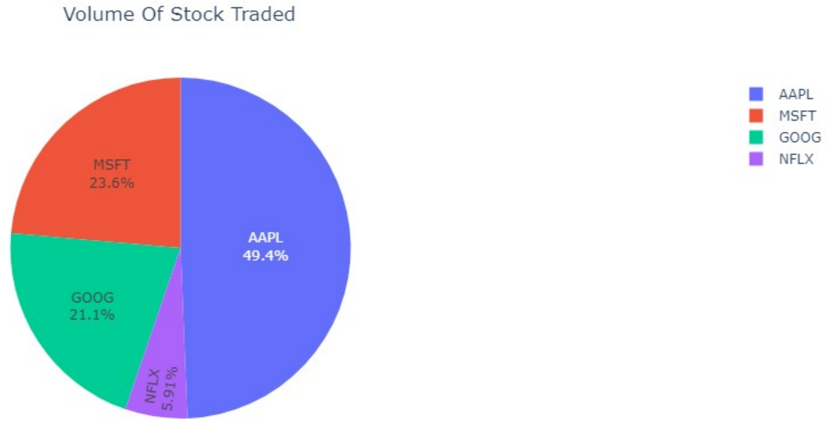
```
  stock        date        Open        High         Low       Close  \
0  AAPL  2023-06-06  179.970001  180.119995  177.429993  179.210007   
1  AAPL  2023-06-07  178.440002  181.210007  177.320007  177.820007   
```

```
2  AAPL 2023-06-08  177.899994  180.839996  177.460007  180.570007
3  AAPL 2023-06-09  181.500000  182.229996  180.630005  180.960007
4  AAPL 2023-06-12  181.270004  183.889999  180.970001  183.789993

    Adj Close    Volume  Volatility  MA10  MA20
0  178.968338  64848400         NaN   NaN   NaN
1  177.580200  61944600         NaN   NaN   NaN
2  180.326492  50214900         NaN   NaN   NaN
3  180.715973  48870700         NaN   NaN   NaN
4  183.542145  54274900         NaN   NaN   NaN
```

```
v=df.groupby('stock').Volume.sum()
v
```

```
stock
AAPL    3437228581
GOOG    1470628326
MSFT    1644865930
NFLX     411382411
Name: Volume, dtype: int64
```

```
fig=px.pie(v,names=v.index,values=v.values,color_discrete_map={'Thur':
'lightcyan',
                                 'Fri':'cyan',
                                 'Sat':'royalblue',
                                 'Sun':'darkblue'})
fig.update_traces(textposition='inside', textinfo='percent+label')#
specifying the the text position and info
# adding the title
fig.update_layout(title="Volume Of Stock Traded",title_x=0.47,)
#increasing the size of chart and adding background
fig.update_layout(
    autosize=False,
    width=500,
    height=500,
    margin=dict(
        l=50,
        r=50,
        b=100,
        t=100,
        pad=4
    ),
    paper_bgcolor="white",
)
fig.show()
```



Summary

Stock Market Performance Analysis involves calculating moving averages, measuring volatility, conducting correlation analysis, analyzing various aspects of the stock market to gain a deeper understanding of the factors that affect stock prices and the relationships between the stock prices of different companies. I hope you liked this project on Stock Market Performance Analysis using Python.