Importing Libraries

In [48]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
import plotly.express as px
```

In [2]:
```
import glob
```

In [3]:
```
glob.glob(r'C:\Aabid Study\LEARNING DATA SCIENCE\Projects\S&P Data Analysis\S&P_resources\individual_stocks_5yr/*csv')
```

```
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Importing the data of Apple, Amazon, Google, Microsoft

In [4]:
```python
company_list = [r'C:\\Aabid Study\\LEARNING DATA SCIENCE\\Projects\\S&P Data Analysis\\S&P_resources\\individual_stocks_5yr\\A
                r'C:\\Aabid Study\\LEARNING DATA SCIENCE\\Projects\\S&P Data Analysis\\S&P_resources\\individual_stocks_5yr\\A
                r'C:\\Aabid Study\\LEARNING DATA SCIENCE\\Projects\\S&P Data Analysis\\S&P_resources\\individual_stocks_5yr\\G
                r'C:\\Aabid Study\\LEARNING DATA SCIENCE\\Projects\\S&P Data Analysis\\S&P_resources\\individual_stocks_5yr\\M
                 ]
```

In [5]:
```python
import warnings
from warnings import filterwarnings
filterwarnings('ignore')
```

In [12]:
```python
data_list = []
for file in company_list:
    current_df = pd.read_csv(file)
```

```
    data_list.append(current_df)

all_data = pd.concat(data_list, ignore_index=True)
```

In [13]:
```
all_data.shape
```

Out[13]:
```
(4752, 7)
```

In [14]:
```
all_data.head(6)
```

Out[14]:

	date	open	high	low	close	volume	Name
0	2013-02-08	67.7142	68.4014	66.8928	67.8542	158168416	AAPL
1	2013-02-11	68.0714	69.2771	67.6071	68.5614	129029425	AAPL
2	2013-02-12	68.5014	68.9114	66.8205	66.8428	151829363	AAPL
3	2013-02-13	66.7442	67.6628	66.1742	66.7156	118721995	AAPL
4	2013-02-14	66.3599	67.3771	66.2885	66.6556	88809154	AAPL
5	2013-02-15	66.9785	67.1656	65.7028	65.7371	97924631	AAPL

In [15]:
```
all_data['Name'].unique()
```

Out[15]:
```
array(['AAPL', 'AMZN', 'GOOG', 'MSFT'], dtype=object)
```

What was the change in price of the stock overtime?

In [16]:
```
all_data.isnull().sum()
```

Out[16]:
```
date      0
open      0
high      0
low       0
close     0
volume    0
Name      0
dtype: int64
```

In [19]:
```
all_data.dtypes
```

Out[19]:
```
date       object
open      float64
high      float64
low       float64
close     float64
volume      int64
Name       object
dtype: object
```

converting date column from string to datetime

In [21]:
```
all_data['date'] = pd.to_datetime(all_data['date'])
```

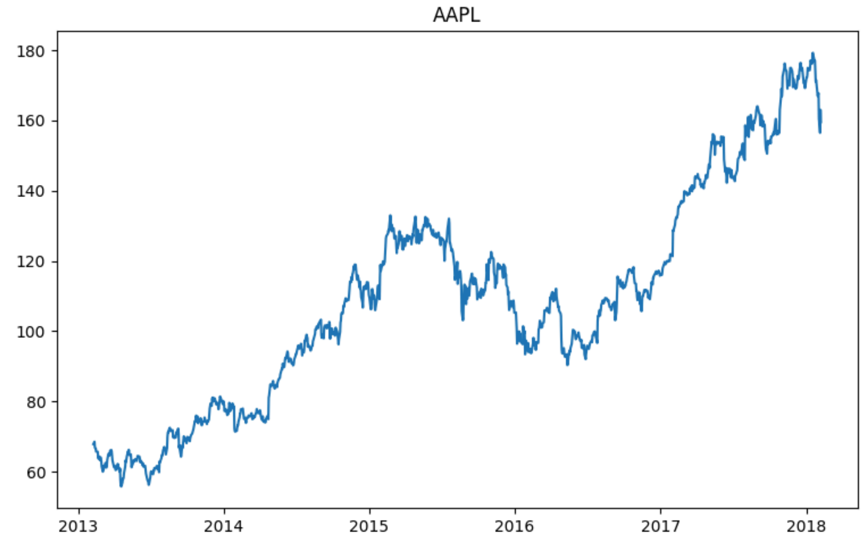
In [22]:
```
tech_list = all_data['Name'].unique()
```

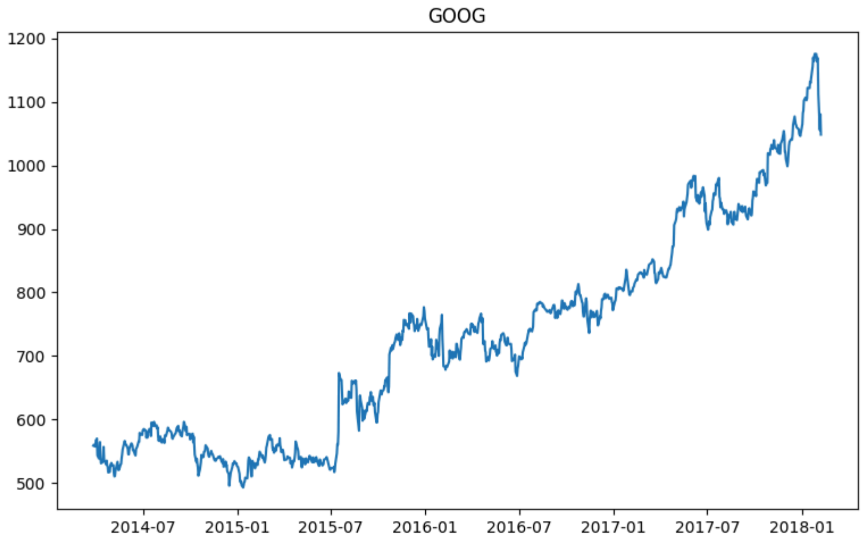
In [23]:
```
tech_list
```

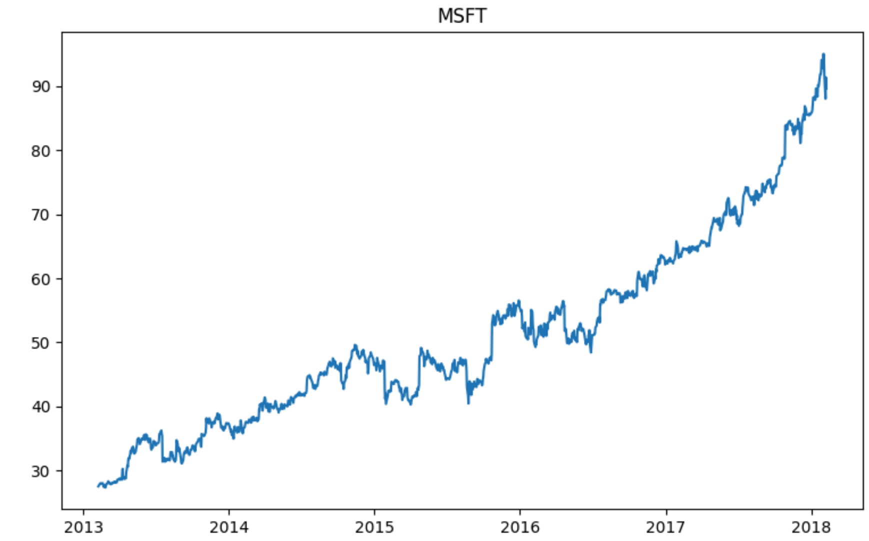
Out[23]:
```
array(['AAPL', 'AMZN', 'GOOG', 'MSFT'], dtype=object)
```

In [28]:
```
plt.figure(figsize=(20,12))

for index, company in enumerate(tech_list, 1):
    plt.subplot(2,2,index)
    filter1 = all_data['Name']== company
    df = all_data[filter1]
    plt.plot(df['date'], df['close'])
    plt.title(company)
```







What was the moving average of the various stock?

In [29]:
```
all_data['close'].head(15)
```

Out[29]:
```
0     67.8542
1     68.5614
2     66.8428
3     66.7156
4     66.6556
5     65.7371
6     65.7128
7     64.1214
8     63.7228
9     64.4014
10    63.2571
11    64.1385
12    63.5099
13    63.0571
14    61.4957
Name: close, dtype: float64
```

In [30]:
```
all_data['close'].rolling(window=10).mean().head(14)
```

Out[30]:
```
0          NaN
1          NaN
2          NaN
3          NaN
4          NaN
5          NaN
6          NaN
7          NaN
8          NaN
9     66.03251
10    65.57280
11    65.13051
12    64.79722
13    64.43137
Name: close, dtype: float64
```

In [31]:
```
new_data = all_data.copy()
```

In [32]:
```
ma_day = [10,20,50]
for ma in ma_day:
    new_data['close_'+str(ma)] = new_data['close'].rolling(window= ma).mean()
```

In [33]:
```
new_data.tail(7)
```

Out[33]:

	date	open	high	low	close	volume	Name	close_10	close_20	close_50
4745	2018-01-30	93.30	93.660	92.1000	92.74	38635053	MSFT	91.862	89.8285	86.5244
4746	2018-01-31	93.75	95.400	93.5100	95.01	48756338	MSFT	92.349	90.2815	86.7606
4747	2018-02-01	94.79	96.070	93.5813	94.26	47227882	MSFT	92.765	90.6770	86.9978
4748	2018-02-02	93.64	93.970	91.5000	91.78	47867753	MSFT	92.943	90.9105	87.1828
4749	2018-02-05	90.56	93.240	88.0000	88.00	51031465	MSFT	92.582	90.9010	87.2684
4750	2018-02-06	86.89	91.475	85.2500	91.33	67998564	MSFT	92.525	91.0535	87.4328
4751	2018-02-07	90.49	91.770	89.2000	89.61	41107592	MSFT	92.304	91.1230	87.5598

In [34]:
```
new_data.set_index('date', inplace=True)
```

In [35]:
```
new_data
```

Out[35]:

	open	high	low	close	volume	Name	close_10	close_20	close_50
date									
2013-02-08	67.7142	68.4014	66.8928	67.8542	158168416	AAPL	NaN	NaN	NaN
2013-02-11	68.0714	69.2771	67.6071	68.5614	129029425	AAPL	NaN	NaN	NaN
2013-02-12	68.5014	68.9114	66.8205	66.8428	151829363	AAPL	NaN	NaN	NaN
2013-02-13	66.7442	67.6628	66.1742	66.7156	118721995	AAPL	NaN	NaN	NaN
2013-02-14	66.3599	67.3771	66.2885	66.6556	88809154	AAPL	NaN	NaN	NaN
...	...	...	...	...	...	...	...	...	...
2018-02-01	94.7900	96.0700	93.5813	94.2600	47227882	MSFT	92.765	90.6770	86.9978
2018-02-02	93.6400	93.9700	91.5000	91.7800	47867753	MSFT	92.943	90.9105	87.1828
2018-02-05	90.5600	93.2400	88.0000	88.0000	51031465	MSFT	92.582	90.9010	87.2684
2018-02-06	86.8900	91.4750	85.2500	91.3300	67998564	MSFT	92.525	91.0535	87.4328
2018-02-07	90.4900	91.7700	89.2000	89.6100	41107592	MSFT	92.304	91.1230	87.5598

4752 rows × 9 columns

In [41]:
```
plt.figure(figsize=(22,16))

for index, company in enumerate(tech_list, 1):
    plt.subplot(2,2,index)
    filter1 = new_data['Name']== company
    df = new_data[filter1]
    df[['close_10','close_20','close_50']].plot(ax= plt.gca())
    plt.title(company)
```

Analysis the closing price change in Apple Stock

In [55]:
```
apple_df = pd.read_csv(r'C:\\Aabid Study\\LEARNING DATA SCIENCE\\Projects\\S&P Data Analysis\\S&P_resources\\individual_stocks
```

In [56]:
```
apple_df.head(4)
```

Out[56]:

	date	open	high	low	close	volume	Name
0	2013-02-08	67.7142	68.4014	66.8928	67.8542	158168416	AAPL
1	2013-02-11	68.0714	69.2771	67.6071	68.5614	129029425	AAPL
2	2013-02-12	68.5014	68.9114	66.8205	66.8428	151829363	AAPL
3	2013-02-13	66.7442	67.6628	66.1742	66.7156	118721995	AAPL

In [57]:
```
apple_df['close']
```

Out[57]:
```
0        67.8542
1        68.5614
2        66.8428
3        66.7156
4        66.6556
          ...
1254    167.7800
1255    160.5000
1256    156.4900
1257    163.0300
1258    159.5400
Name: close, Length: 1259, dtype: float64
```

In [58]:
```
apple_df['Daily return(in %)'] = apple_df['close'].pct_change()*100
```

In [59]:
```
px.line(apple_df, x = 'date', y = 'Daily return(in %)')
```

Performing resampling analysis of closing price of Apple Stock

In [60]:
```
apple_df['date'] = pd.to_datetime(apple_df['date'])
```

In [62]:
```
apple_df.dtypes
```

Out[62]:
```
date                   datetime64[ns]
open                          float64
high                          float64
low                           float64
close                         float64
volume                          int64
Name                           object
Daily return(in %)            float64
dtype: object
```

In [63]:
```
apple_df.head(4)
```

Out[63]:

	date	open	high	low	close	volume	Name	Daily return(in %)
0	2013-02-08	67.7142	68.4014	66.8928	67.8542	158168416	AAPL	NaN
1	2013-02-11	68.0714	69.2771	67.6071	68.5614	129029425	AAPL	1.042235
2	2013-02-12	68.5014	68.9114	66.8205	66.8428	151829363	AAPL	-2.506658
3	2013-02-13	66.7442	67.6628	66.1742	66.7156	118721995	AAPL	-0.190297

In [64]:
```
apple_df.set_index('date', inplace=True)
```

In [65]:
```
apple_df.head(4)
```

Out[65]:

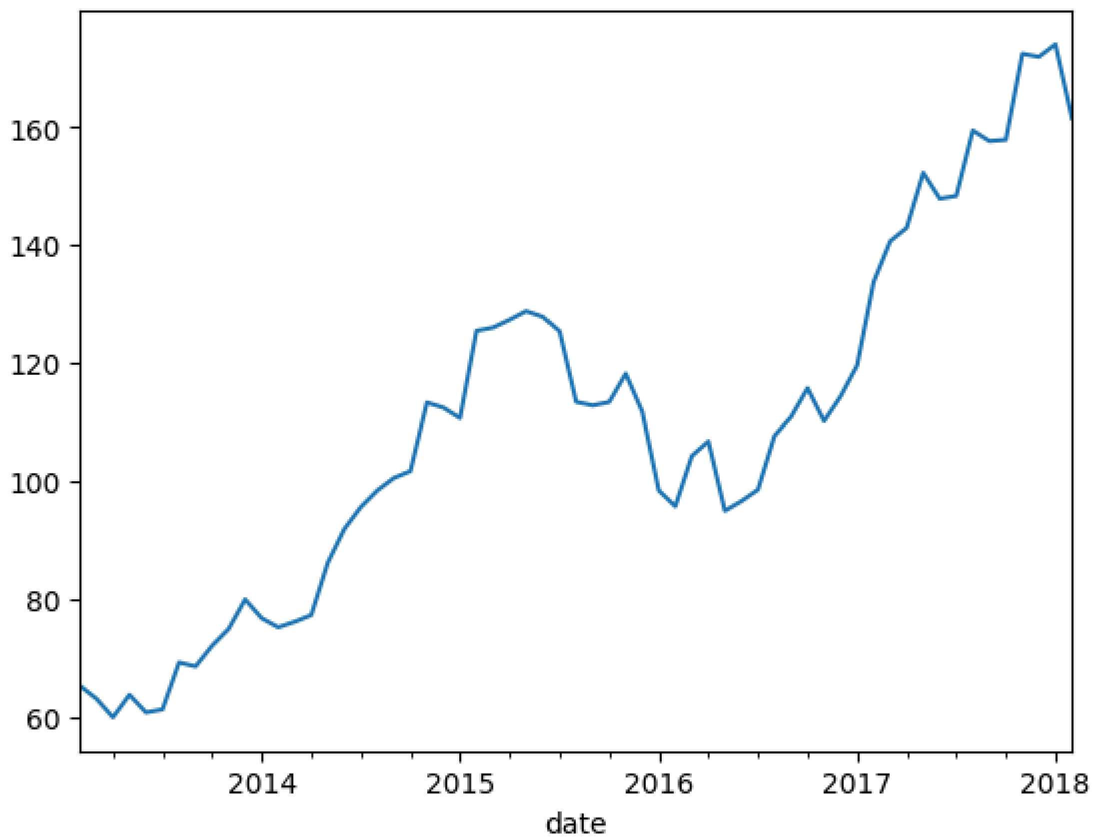
	open	high	low	close	volume	Name	Daily return(in %)
date							
2013-02-08	67.7142	68.4014	66.8928	67.8542	158168416	AAPL	NaN
2013-02-11	68.0714	69.2771	67.6071	68.5614	129029425	AAPL	1.042235
2013-02-12	68.5014	68.9114	66.8205	66.8428	151829363	AAPL	-2.506658
2013-02-13	66.7442	67.6628	66.1742	66.7156	118721995	AAPL	-0.190297

In [69]:
```
apple_df['close'].resample('M').mean()
```

Out[69]:
```
date
2013-02-28     65.306264
2013-03-31     63.120110
2013-04-30     59.966432
2013-05-31     63.778927
2013-06-30     60.791120
                 ...
2017-10-31    157.817273
2017-11-30    172.406190
2017-12-31    171.891500
2018-01-31    174.005238
2018-02-28    161.468000
Freq: ME, Name: close, Length: 61, dtype: float64
```

In [67]:
```
apple_df['close'].resample('M').mean().plot()
```

Out[67]: <Axes: xlabel='date'>

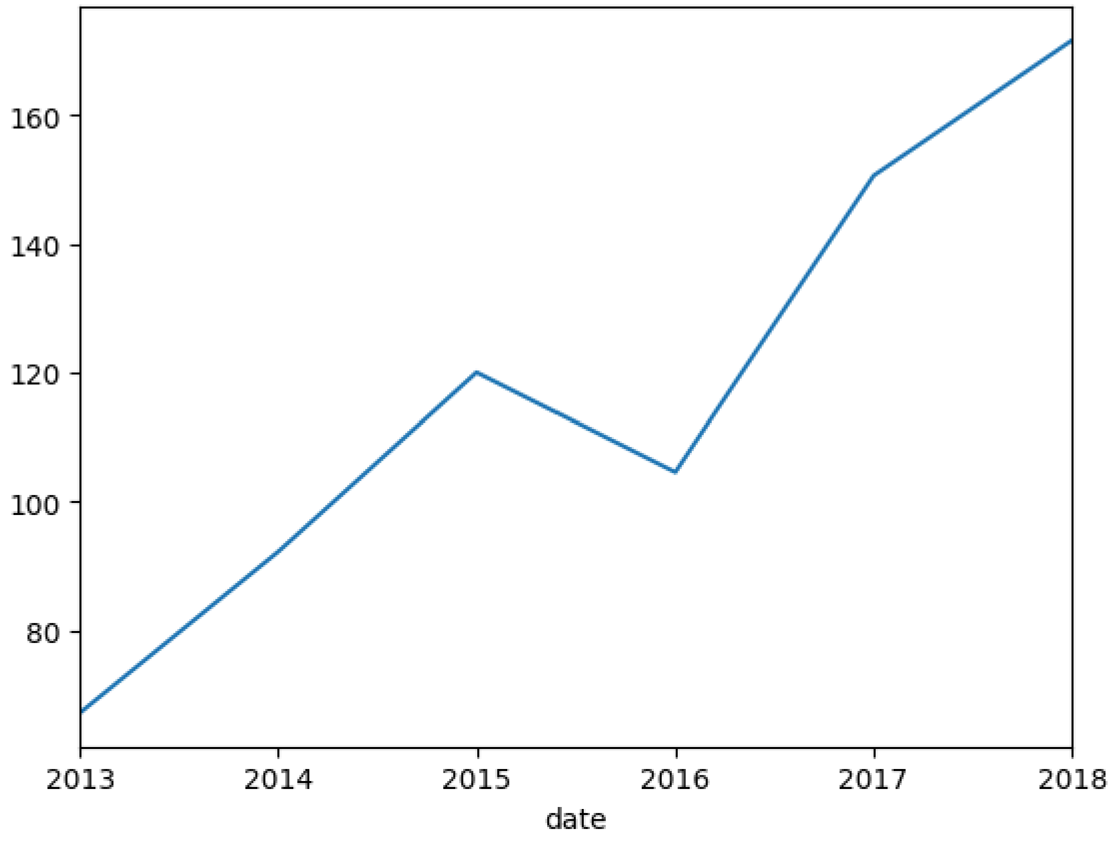


In [70]:
```
apple_df['close'].resample('Y').mean()
```

Out[70]:
```
date
2013-12-31     67.237839
2014-12-31     92.264531
2015-12-31    120.039861
2016-12-31    104.604008
2017-12-31    150.585080
2018-12-31    171.594231
Freq: YE-DEC, Name: close, dtype: float64
```

In [68]:
```
apple_df['close'].resample('Y').mean().plot()
```

Out[68]: <Axes: xlabel='date'>

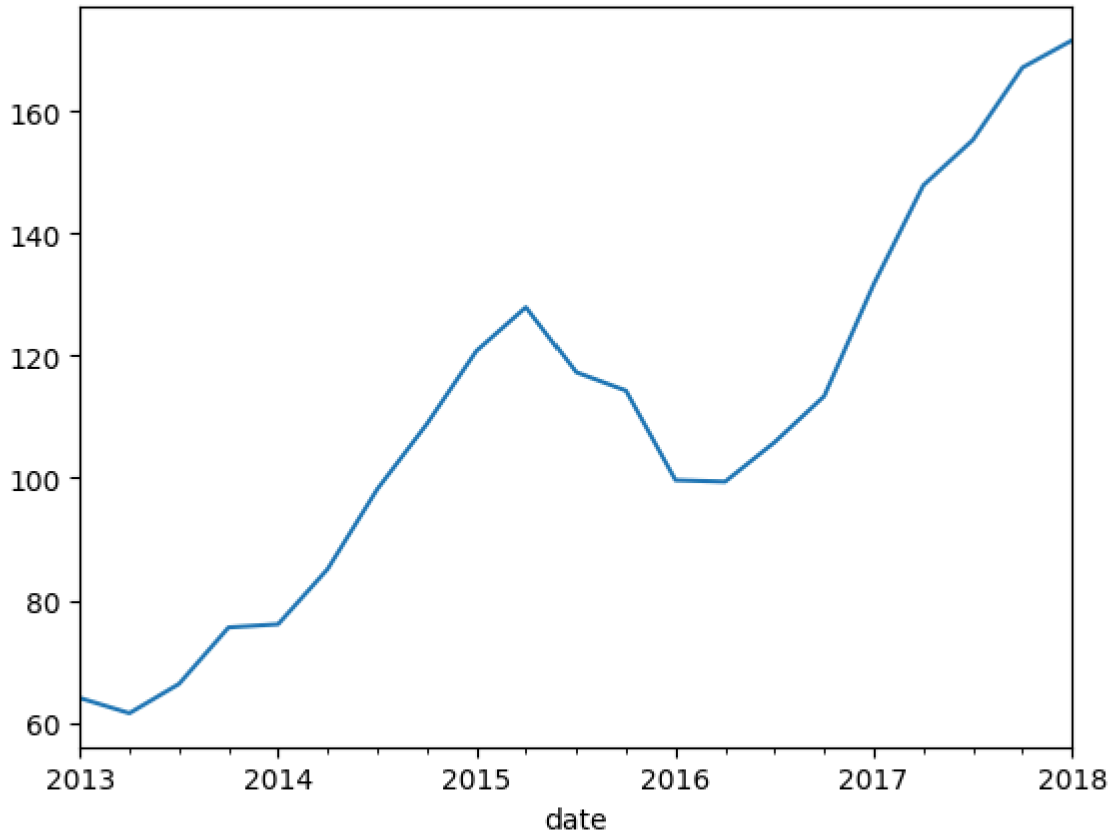


In [71]:
```
apple_df['close'].resample('Q').mean()
```

Out[71]:
```
date
2013-03-31     64.020291
2013-06-30     61.534692
2013-09-30     66.320670
2013-12-31     75.567478
2014-03-31     76.086293
2014-06-30     85.117475
2014-09-30     98.163311
2014-12-31    108.821016
2015-03-31    120.776721
2015-06-30    127.937937
2015-09-30    117.303438
2015-12-31    114.299297
2016-03-31     99.655082
2016-06-30     99.401250
2016-09-30    105.866094
2016-12-31    113.399048
2017-03-31    131.712500
2017-06-30    147.875397
2017-09-30    155.304603
2017-12-31    167.148254
2018-03-31    171.594231
Freq: QE-DEC, Name: close, dtype: float64
```

In [72]:
```
apple_df['close'].resample('Q').mean().plot()
```

Out[72]: <Axes: xlabel='date'>



Checking if the closing prices of these tech companies(Apple, Amazon, Google, Microsoft) are correlated or not!

In [73]:
```
company_list
```

Out[73]:
```
['C:\\\\Aabid Study\\\\LEARNING DATA SCIENCE\\\\Projects\\\\S&P Data Analysis\\\\S&P_resources\\\\individual_stocks_5yr\\\\AAPL_data.csv',
 'C:\\\\Aabid Study\\\\LEARNING DATA SCIENCE\\\\Projects\\\\S&P Data Analysis\\\\S&P_resources\\\\individual_stocks_5yr\\\\AMZN_data.csv',
 'C:\\\\Aabid Study\\\\LEARNING DATA SCIENCE\\\\Projects\\\\S&P Data Analysis\\\\S&P_resources\\\\individual_stocks_5yr\\\\GOOG_data.csv',
 'C:\\\\Aabid Study\\\\LEARNING DATA SCIENCE\\\\Projects\\\\S&P Data Analysis\\\\S&P_resources\\\\individual_stocks_5yr\\\\MSFT_data.csv']
```

In [75]:
```
Apple = pd.read_csv(company_list[0])
Amazon = pd.read_csv(company_list[1])
Google = pd.read_csv(company_list[2])
Microsoft = pd.read_csv(company_list[3])
```

In [76]:
```
closing_price = pd.DataFrame()
```

In [77]:
```
closing_price['Apple_close'] = Apple['close']
closing_price['Amazon_close'] = Amazon['close']
closing_price['Google_close'] = Google['close']
closing_price['Microsoft_close'] = Microsoft['close']
```

In [78]:
```
closing_price
```

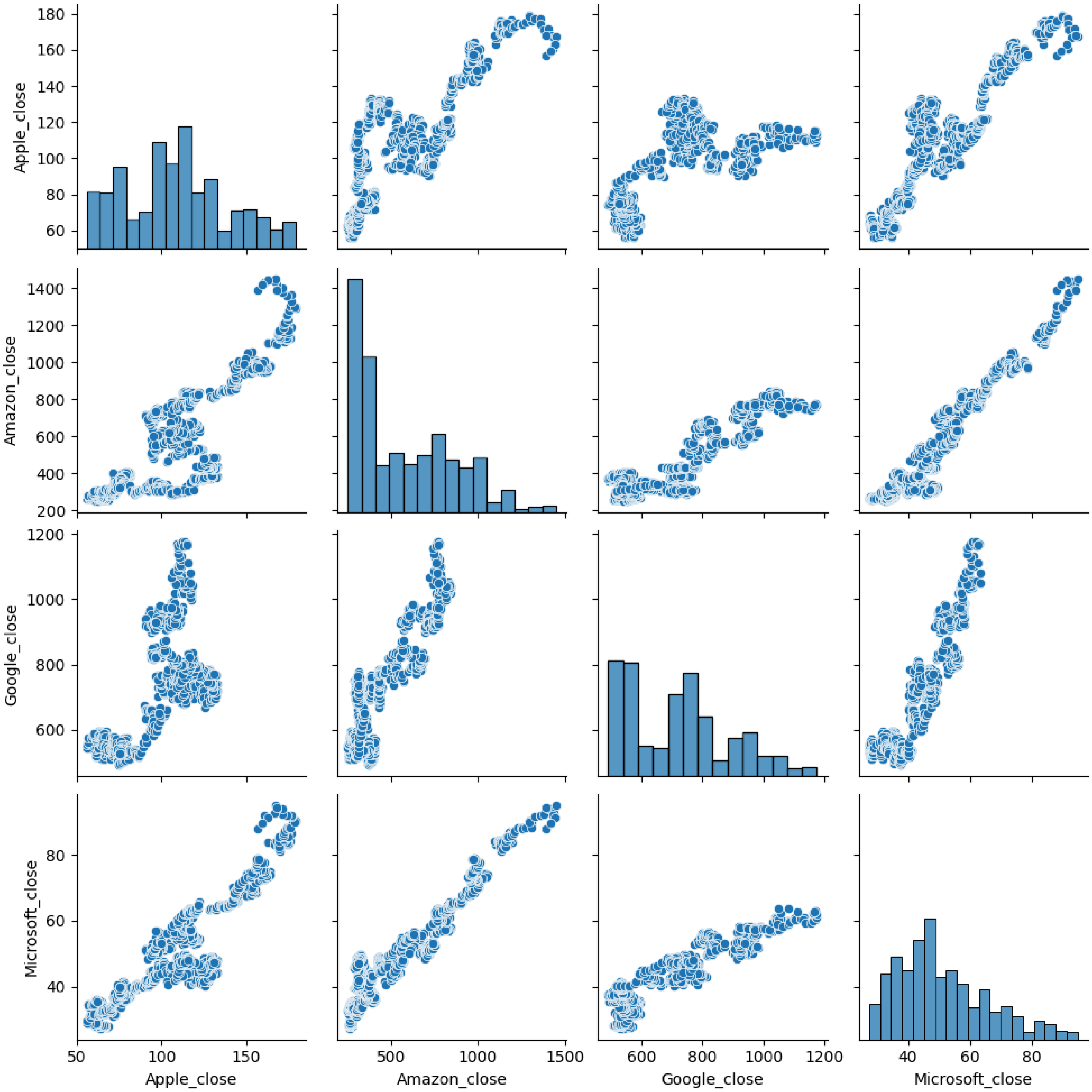
Out[78]:

	Apple_close	Amazon_close	Google_close	Microsoft_close
0	67.8542	261.95	558.46	27.55
1	68.5614	257.21	559.99	27.86
2	66.8428	258.70	556.97	27.88
3	66.7156	269.47	567.16	28.03
4	66.6556	269.24	567.00	28.04
...	...	...	...	...
1254	167.7800	1390.00	NaN	94.26
1255	160.5000	1429.95	NaN	91.78
1256	156.4900	1390.00	NaN	88.00
1257	163.0300	1442.84	NaN	91.33
1258	159.5400	1416.78	NaN	89.61

1259 rows × 4 columns

In [79]:
```
sns.pairplot(closing_price)
```

Out[79]: <seaborn.axisgrid.PairGrid at 0x1e22f2d2360>



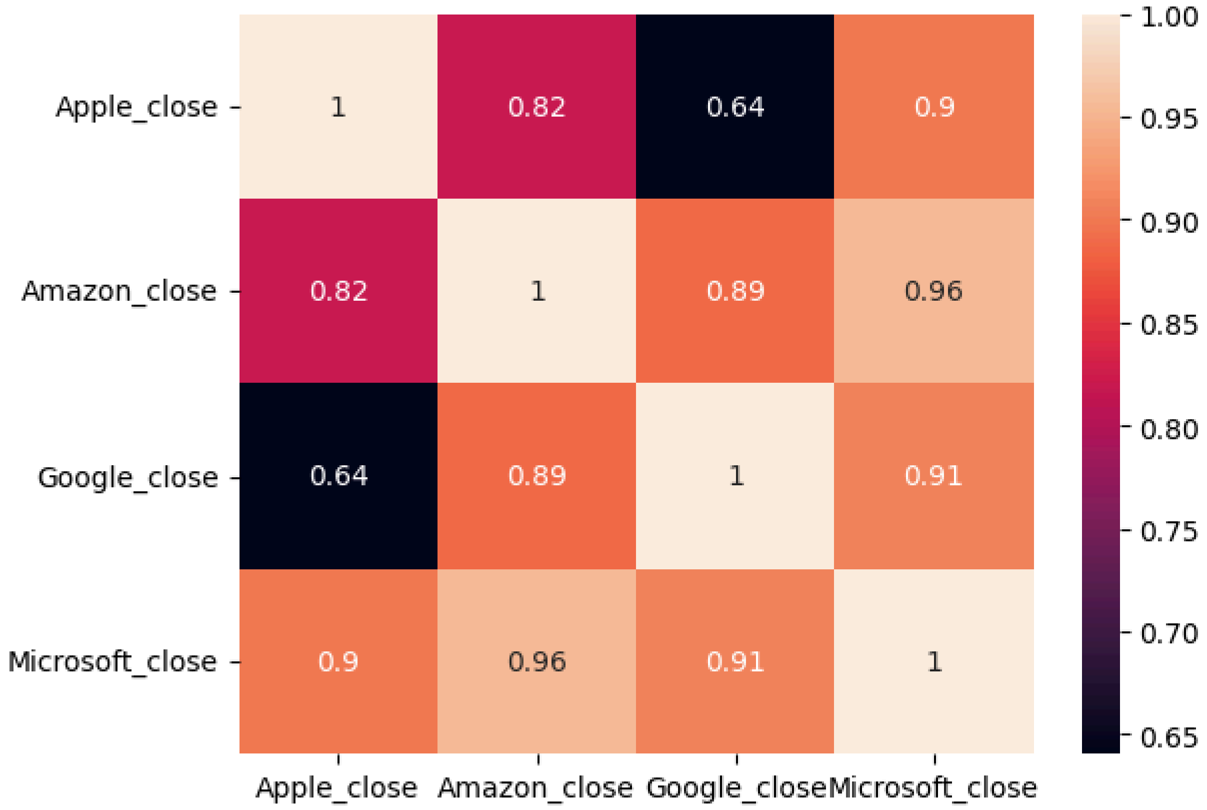
In [80]:
```
closing_price.corr()
```

Out[80]:

	Apple_close	Amazon_close	Google_close	Microsoft_close
Apple_close	1.000000	0.819078	0.640522	0.899689
Amazon_close	0.819078	1.000000	0.888456	0.955977
Google_close	0.640522	0.888456	1.000000	0.907011
Microsoft_close	0.899689	0.955977	0.907011	1.000000

In [82]:
```
sns.heatmap(closing_price.corr(), annot=True)
```

Out[82]: <Axes: >



Analysis whether daily change in closing price of stocks or daily returns in stock are co-related or not !

In [83]:
```
closing_price['Apple_close']
```

Out[83]:
```
0        67.8542
1        68.5614
2        66.8428
3        66.7156
4        66.6556
          ...
1254    167.7800
1255    160.5000
1256    156.4900
1257    163.0300
1258    159.5400
Name: Apple_close, Length: 1259, dtype: float64
```

In [84]:
```
closing_price['Apple_close'].shift(1)
```

Out[84]:
```
0            NaN
1        67.8542
2        68.5614
3        66.8428
4        66.7156
          ...
1254    167.4300
1255    167.7800
1256    160.5000
1257    156.4900
1258    163.0300
Name: Apple_close, Length: 1259, dtype: float64
```

In [85]:
```
(closing_price['Apple_close'] - closing_price['Apple_close'].shift(1))/closing_price['Apple_close'].shift(1) * 100
```

Out[85]:
```
0            NaN
1       1.042235
2      -2.506658
3      -0.190297
4      -0.089934
          ...
1254    0.209043
1255   -4.339015
1256   -2.498442
1257    4.179181
1258   -2.140710
Name: Apple_close, Length: 1259, dtype: float64
```

In [86]:
```
for col in closing_price.columns:
    closing_price[col+'_pct_change'] = (closing_price[col] - closing_price[col].shift(1))/closing_price[col].shift(1) * 100
```

In [87]:
```
closing_price
```

Out[87]:

	Apple_close	Amazon_close	Google_close	Microsoft_close	Apple_close_pct_change	Amazon_close_pct_change	Google_close_pct_chan
0	67.8542	261.95	558.46	27.55	NaN	NaN	N
1	68.5614	257.21	559.99	27.86	1.042235	-1.809506	0.2739
2	66.8428	258.70	556.97	27.88	-2.506658	0.579293	-0.5392
3	66.7156	269.47	567.16	28.03	-0.190297	4.163123	1.8295
4	66.6556	269.24	567.00	28.04	-0.089934	-0.085353	-0.0282
...	...	...	...	...	...	...	
1254	167.7800	1390.00	NaN	94.26	0.209043	-4.196734	N
1255	160.5000	1429.95	NaN	91.78	-4.339015	2.874101	N
1256	156.4900	1390.00	NaN	88.00	-2.498442	-2.793804	N
1257	163.0300	1442.84	NaN	91.33	4.179181	3.801439	N
1258	159.5400	1416.78	NaN	89.61	-2.140710	-1.806160	N

1259 rows × 8 columns

In [88]:
```
closing_price.columns
```

Out[88]:
```
Index(['Apple_close', 'Amazon_close', 'Google_close', 'Microsoft_close',
       'Apple_close_pct_change', 'Amazon_close_pct_change',
       'Google_close_pct_change', 'Microsoft_close_pct_change'],
      dtype='object')
```

In [89]:
```
closing_p = closing_price[['Apple_close_pct_change', 'Amazon_close_pct_change',
       'Google_close_pct_change', 'Microsoft_close_pct_change']]
```

In [90]:
```
closing_p
```

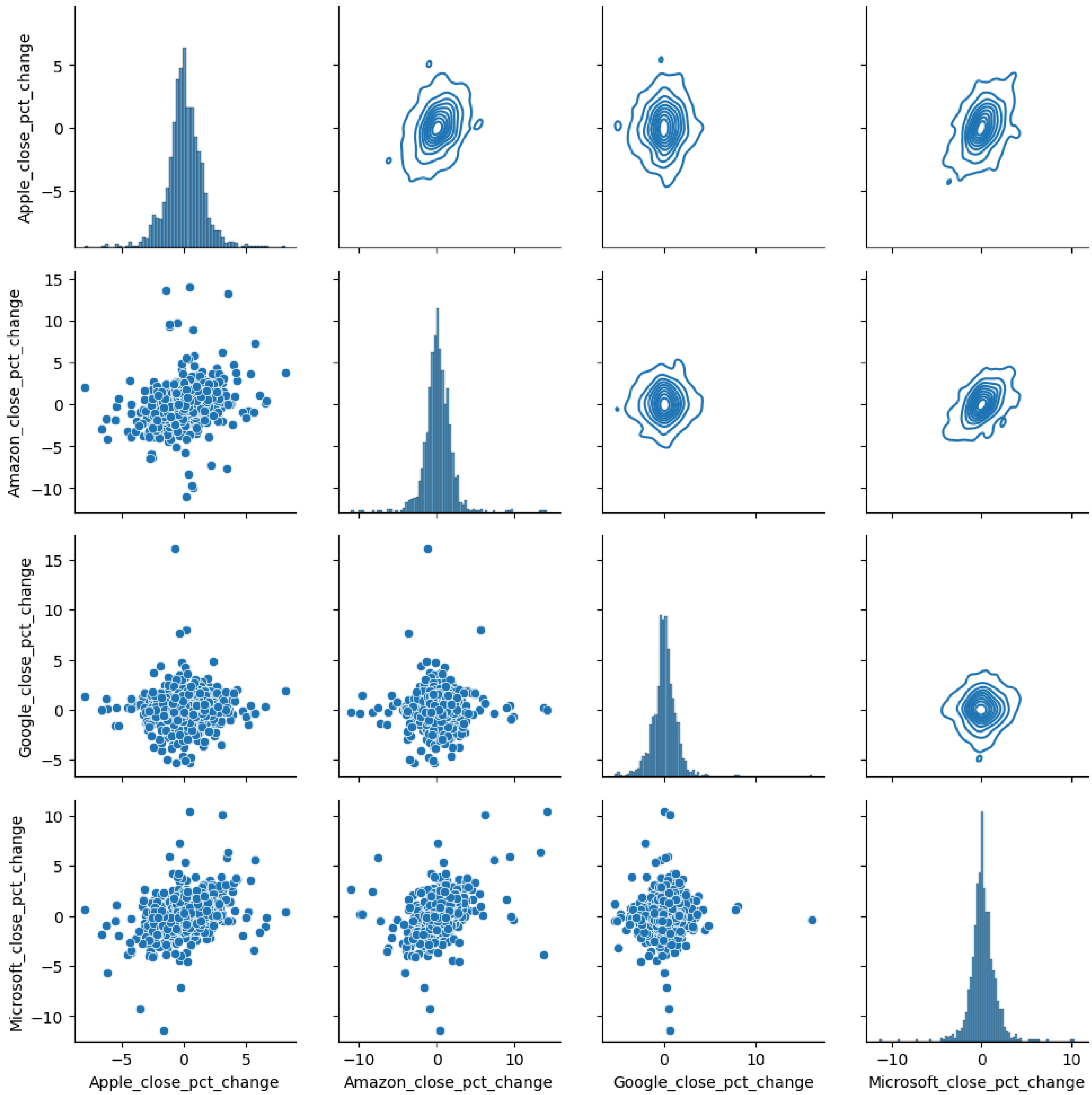
Out[90]:

	Apple_close_pct_change	Amazon_close_pct_change	Google_close_pct_change	Microsoft_close_pct_change
0	NaN	NaN	NaN	NaN
1	1.042235	-1.809506	0.273968	1.125227
2	-2.506658	0.579293	-0.539295	0.071788
3	-0.190297	4.163123	1.829542	0.538020
4	-0.089934	-0.085353	-0.028211	0.035676
...	...	...	...	...
1254	0.209043	-4.196734	NaN	-0.789391
1255	-4.339015	2.874101	NaN	-2.631021
1256	-2.498442	-2.793804	NaN	-4.118544
1257	4.179181	3.801439	NaN	3.784091
1258	-2.140710	-1.806160	NaN	-1.883280

1259 rows × 4 columns

In [93]:
```
g = sns.PairGrid(data = closing_p)
g.map_diag(sns.histplot)
g.map_lower(sns.scatterplot)
g.map_upper(sns.kdeplot)
```

Out[93]:
```
<seaborn.axisgrid.PairGrid at 0x1e232988500>
```



Apple_close_pct_change
Amazon_close_pct_change
Google_close_pct_change
Microsoft_close_pct_change
Apple_close_pct_change
Amazon_close_pct_change
Google_close_pct_change
Microsoft_close_pct_change

In [ ]: