Video_Conferencing_Portfolio

September 29, 2021

1 5 Video Conferencing Stocks Portfolio

[1]:
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
import math

import warnings
warnings.filterwarnings("ignore")

# yahoo finance data
import yfinance as yf
yf.pdr_override()
```

[2]:
```
# input
# 5 Video Conferencing Stocks Wave
title = "Video Conferencing Stocks"
symbols = ['RNG', 'MSFT', 'LOGM', 'GOOGL', 'ZM']
start = '2019-05-01'
end = '2020-08-21'
```

[3]:
```
df = pd.DataFrame()
for s in symbols:
    df[s] = yf.download(s,start,end)['Adj Close']
```

```
[*********************100%***********************]  1 of 1 completed
[*********************100%***********************]  1 of 1 completed
[*********************100%***********************]  1 of 1 completed
[*********************100%***********************]  1 of 1 completed
[*********************100%***********************]  1 of 1 completed
```

[4]:
```
from datetime import datetime
from dateutil import relativedelta

d1 = datetime.strptime(start, "%Y-%m-%d")
d2 = datetime.strptime(end, "%Y-%m-%d")
```

```
delta = relativedelta.relativedelta(d2,d1)
print('How many years of investing?')
print('%s years' % delta.years)
```

```
How many years of investing?
1 years
```

[5]:
```
number_of_years = delta.years
```

[6]:
```
days = (df.index[-1] - df.index[0]).days
days
```

[6]:
```
477
```

[7]:
```
df.head()
```

[7]:
```
                   RNG        MSFT       LOGM        GOOGL         ZM
Date
2019-05-01  114.870003  125.556122  79.965652  1173.319946  72.760002
2019-05-02  115.489998  123.916473  80.222244  1166.510010  75.500000
2019-05-03  119.459999  126.557594  81.110420  1189.550049  79.180000
2019-05-06  121.059998  125.821205  81.653198  1193.459961  78.239998
2019-05-07  118.150002  123.239006  79.706360  1178.859985  73.330002
```

[8]:
```
df.tail()
```

[8]:
```
                   RNG        MSFT       LOGM        GOOGL          ZM
Date
2020-08-14  284.420013  208.396240  85.940002  1504.630005  244.910004
2020-08-17  292.350006  209.772919  85.940002  1516.239990  266.149994
2020-08-18  290.839996  210.979996  85.940002  1555.780029  276.799988
2020-08-19  288.480011  209.699997  85.940002  1544.609985  273.510010
2020-08-20  290.380005  214.580002  85.970001  1576.250000  290.690002
```

[9]:
```
df.min()
```

[9]:
```
RNG       110.919998
MSFT      118.097771
LOGM       65.370865
GOOGL    1038.739990
ZM         62.000000
dtype: float64
```

[10]:
```
df.max()
```

[10]:
```
RNG       305.359985
MSFT      216.017807
```

```
LOGM        86.550003
GOOGL     1576.250000
ZM         290.690002
dtype: float64
```

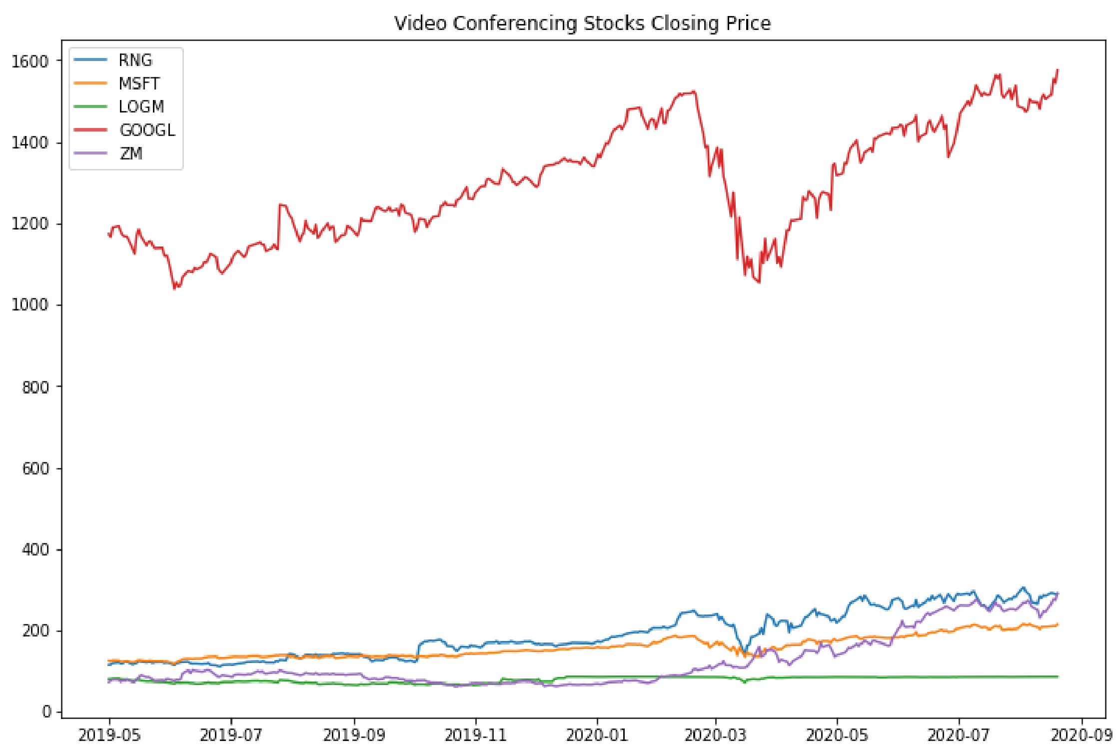
[11]:
```
df.describe()
```

[11]:

	RNG	MSFT	LOGM	GOOGL	ZM
count	331.000000	331.000000	331.000000	331.000000	331.000000
mean	189.595801	158.155668	78.704947	1295.781268	122.457039
std	58.563276	26.495490	7.179298	139.924276	64.824611
min	110.919998	118.097771	65.370865	1038.739990	62.000000
25%	134.464996	135.844734	71.516403	1176.915039	75.664997
50%	172.470001	150.552383	81.110420	1288.859985	92.690002
75%	239.430000	180.392914	85.360001	1420.510010	150.254997
max	305.359985	216.017807	86.550003	1576.250000	290.690002

[12]:
```
plt.figure(figsize=(12,8))
plt.plot(df)
plt.title(title + ' Closing Price')
plt.legend(labels=df.columns)
```

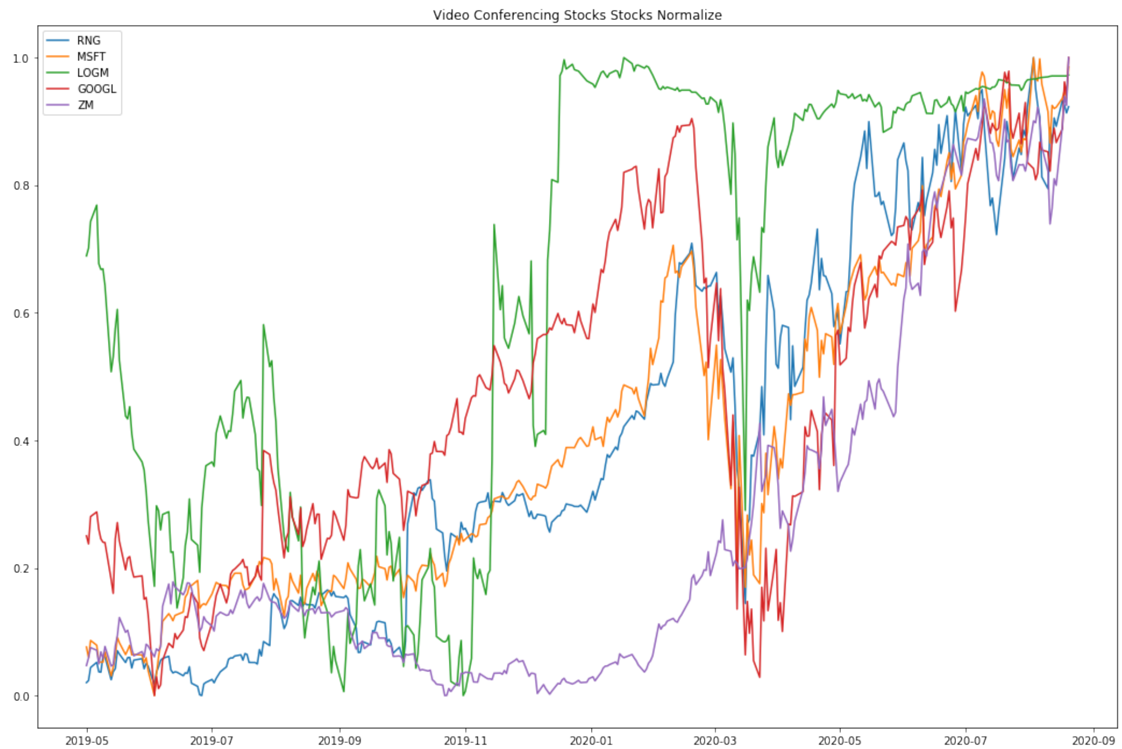
[12]: <matplotlib.legend.Legend at 0x1fbb9a20dd8>



[13]:
```
# Normalize the data
normalize = (df - df.min())/ (df.max() - df.min())
```

[14]:
```
plt.figure(figsize=(18,12))
plt.plot(normalize)
plt.title(title + ' Stocks Normalize')
plt.legend(labels=normalize.columns)
```

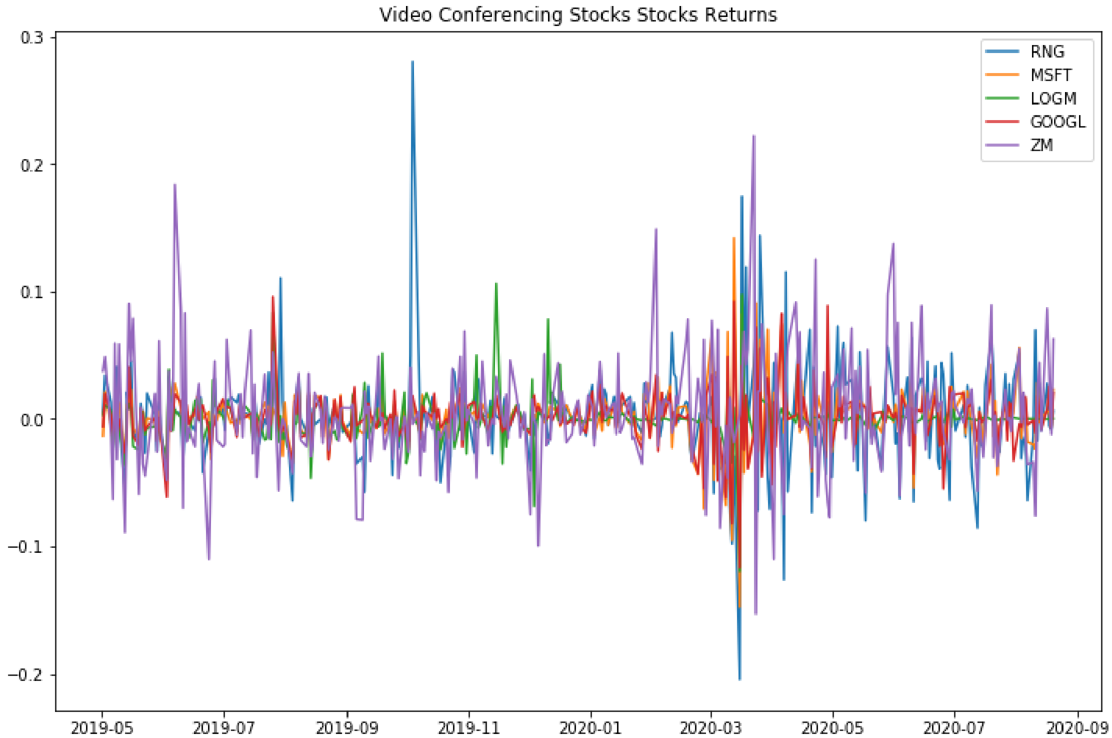
[14]: <matplotlib.legend.Legend at 0x1fbb9cbc7b8>



[15]:
```
stock_rets = df.pct_change().dropna()
```

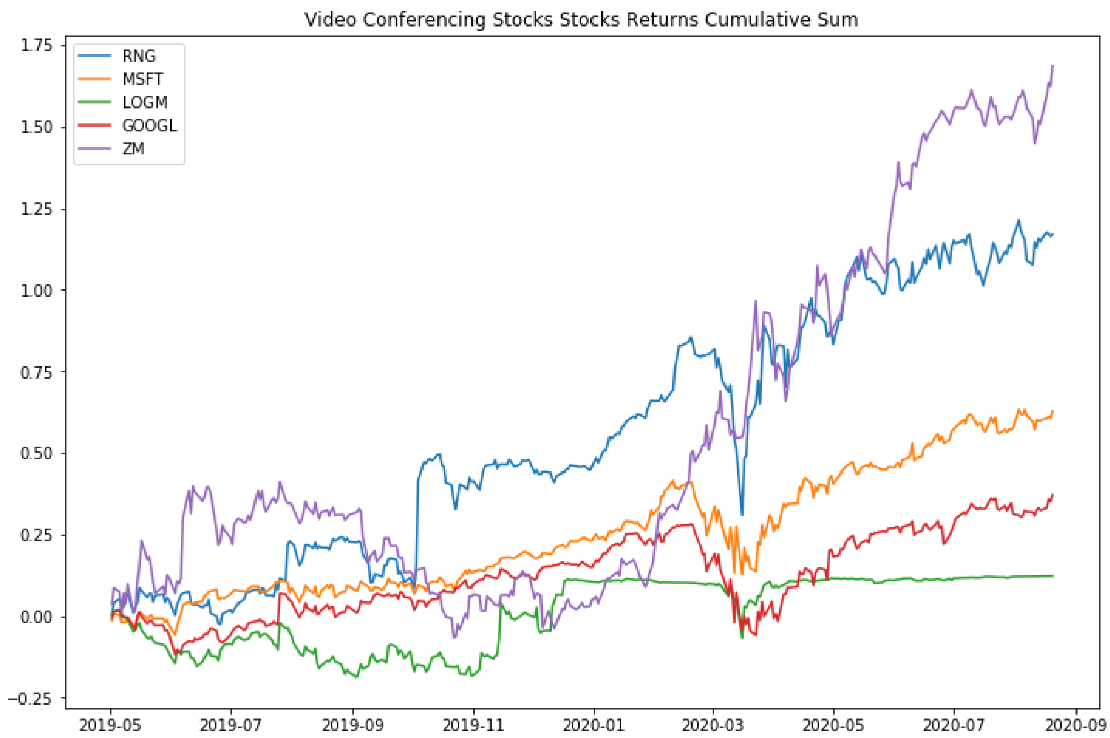
[16]:
```
plt.figure(figsize=(12,8))
plt.plot(stock_rets)
plt.title(title + ' Stocks Returns')
plt.legend(labels=stock_rets.columns)
```

[16]: <matplotlib.legend.Legend at 0x1fbb9acce48>



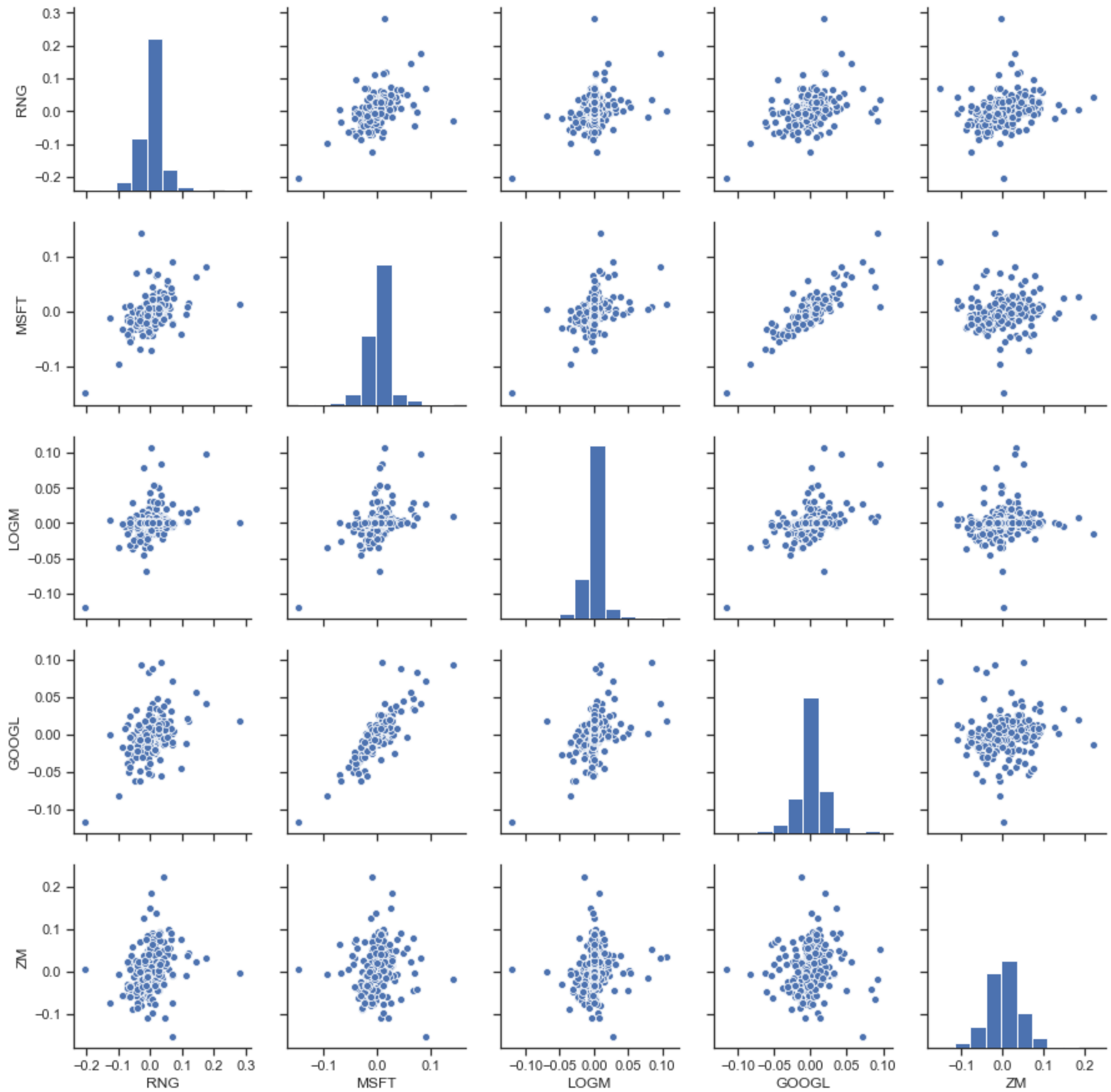
[17]:
```
plt.figure(figsize=(12,8))
plt.plot(stock_rets.cumsum())
plt.title(title + ' Stocks Returns Cumulative Sum')
plt.legend(labels=stock_rets.columns)
```

[17]: <matplotlib.legend.Legend at 0x1fbb9b1ff98>

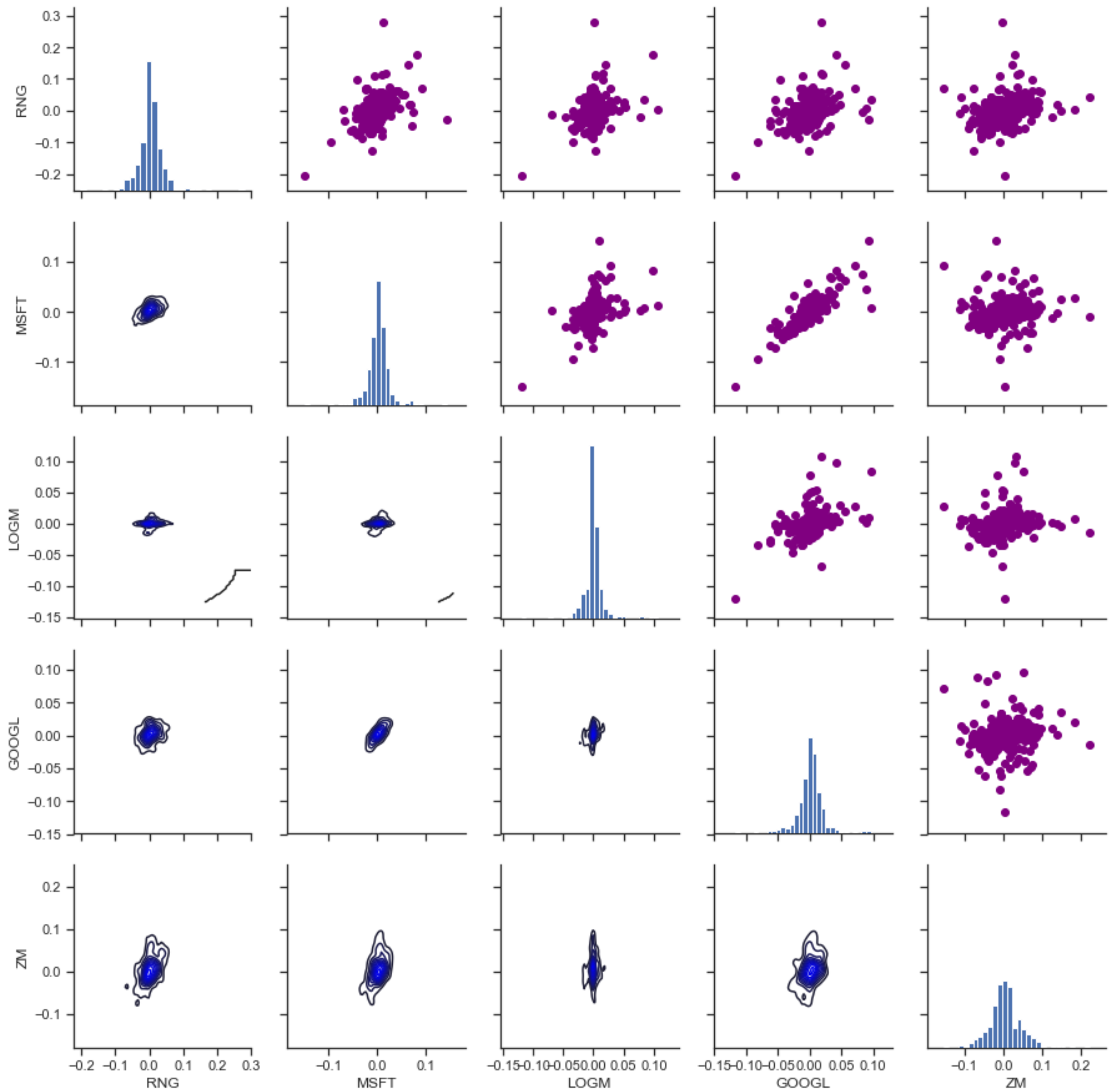


[18]:

```
sns.set(style='ticks')
ax = sns.pairplot(stock_rets, diag_kind='hist')

nplot = len(stock_rets.columns)
for i in range(nplot) :
    for j in range(nplot) :
        ax.axes[i, j].locator_params(axis='x', nbins=6, tight=True)
```

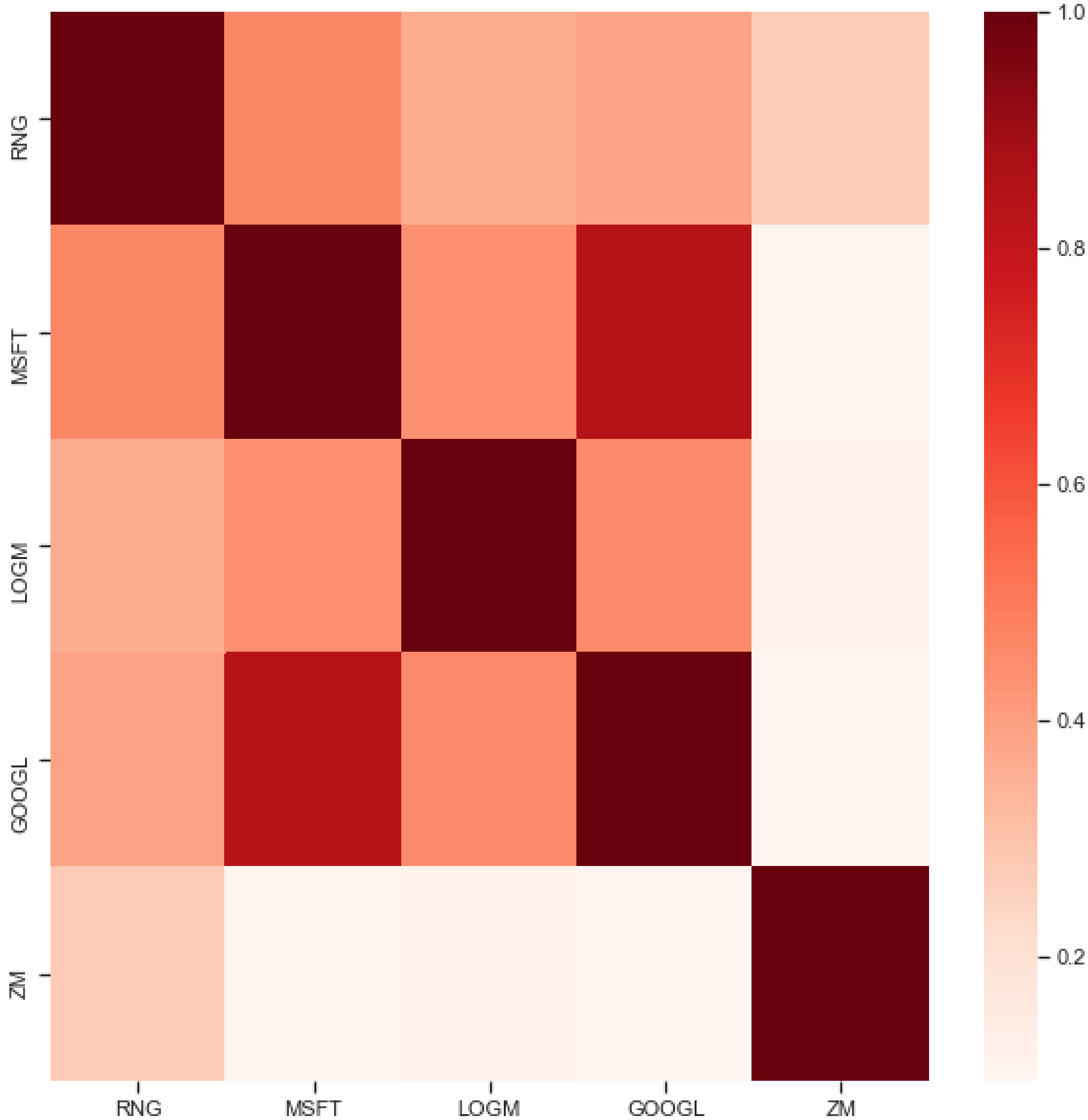


[19]:
```
ax = sns.PairGrid(stock_rets)
ax.map_upper(plt.scatter, color='purple')
ax.map_lower(sns.kdeplot, color='blue')
ax.map_diag(plt.hist, bins=30)
for i in range(nplot) :
    for j in range(nplot) :
        ax.axes[i, j].locator_params(axis='x', nbins=6, tight=True)
```



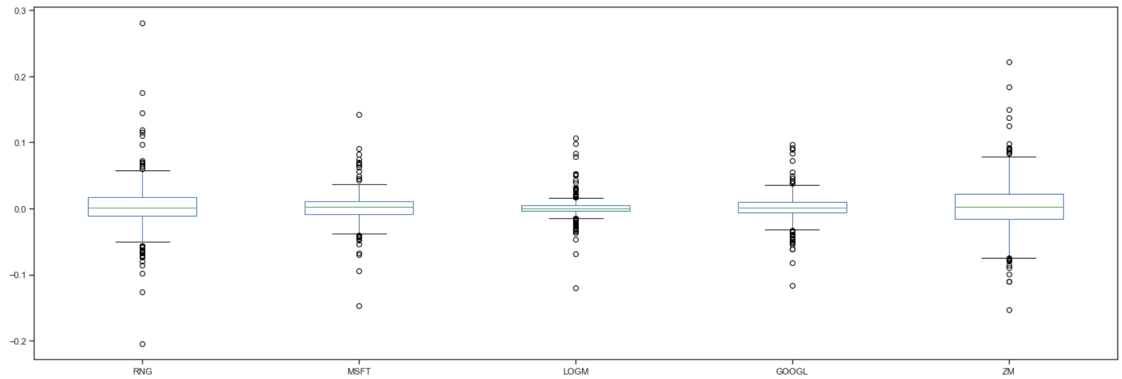
[20]:
```
plt.figure(figsize=(10,10))
corr = stock_rets.corr()

# plot the heatmap
sns.heatmap(corr,
        xticklabels=corr.columns,
        yticklabels=corr.columns,
            cmap="Reds")
```

[20]: <matplotlib.axes._subplots.AxesSubplot at 0x1fbbd7c0550>

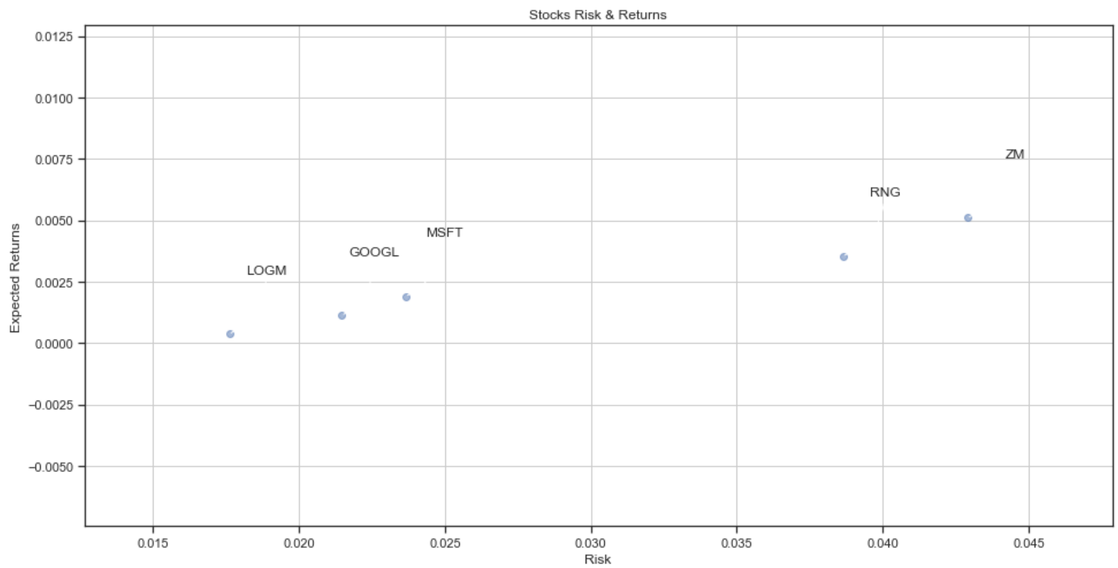


[21]:
```
# Box plot
stock_rets.plot(kind='box',figsize=(24,8))
```

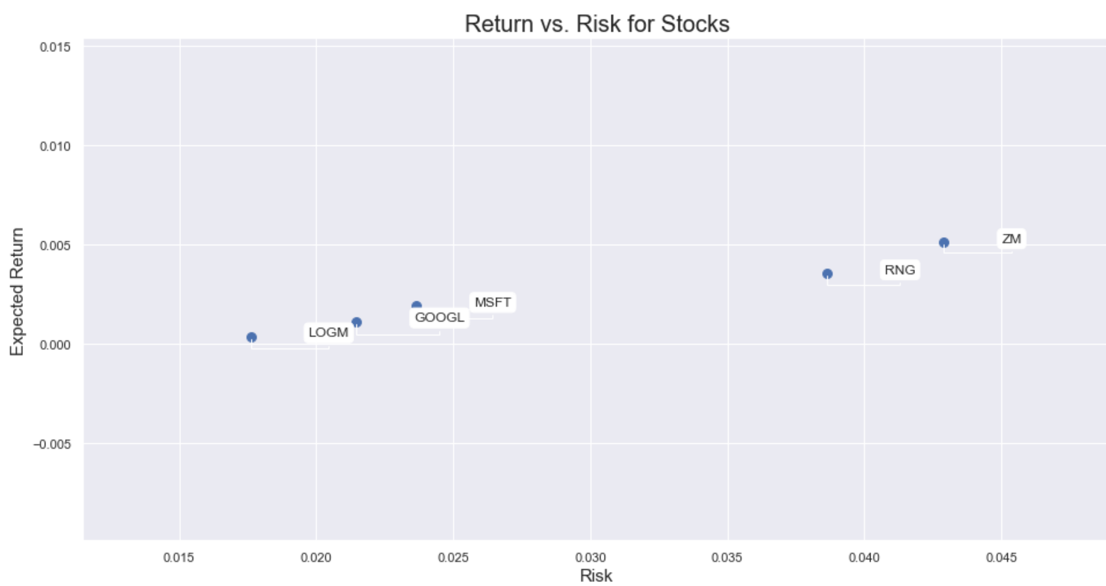
[21]: <matplotlib.axes._subplots.AxesSubplot at 0x1fbbd739160>



[22]:
```
rets = stock_rets.dropna()

plt.figure(figsize=(16,8))
plt.scatter(rets.std(), rets.mean(),alpha = 0.5)

plt.title('Stocks Risk & Returns')
plt.xlabel('Risk')
plt.ylabel('Expected Returns')
plt.grid(which='major')

for label, x, y in zip(rets.columns, rets.std(), rets.mean()):
    plt.annotate(
        label,
        xy = (x, y), xytext = (50, 50),
        textcoords = 'offset points', ha = 'right', va = 'bottom',
        arrowprops = dict(arrowstyle = '-', connectionstyle = 'arc3,rad=-0.3'))
```



[23]:
```
rets = stock_rets.dropna()
area = np.pi*20.0

sns.set(style='darkgrid')
plt.figure(figsize=(16,8))
plt.scatter(rets.std(), rets.mean(), s=area)
plt.xlabel("Risk", fontsize=15)
plt.ylabel("Expected Return", fontsize=15)
plt.title("Return vs. Risk for Stocks", fontsize=20)

for label, x, y in zip(rets.columns, rets.std(), rets.mean()) :
    plt.annotate(label, xy=(x,y), xytext=(50, 0), textcoords='offset points',
                 arrowprops=dict(arrowstyle='-',␣
 ↪connectionstyle='bar,angle=180,fraction=-0.2'),
                 bbox=dict(boxstyle="round", fc="w"))
```

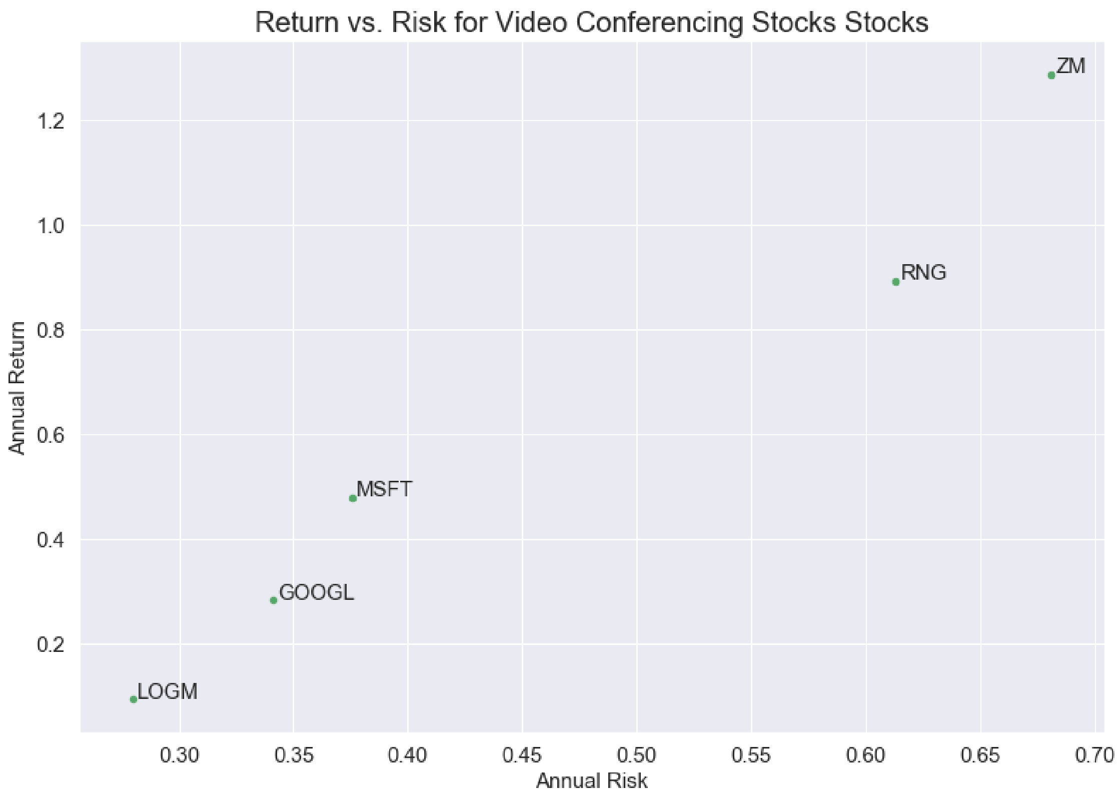


[24]:
```
def annual_risk_return(stock_rets):
    tradeoff = stock_rets.agg(["mean", "std"]).T
    tradeoff.columns = ["Return", "Risk"]
    tradeoff.Return = tradeoff.Return*252
    tradeoff.Risk = tradeoff.Risk * np.sqrt(252)
    return tradeoff
```

[25]:
```
tradeoff = annual_risk_return(stock_rets)
tradeoff
```

[25]:
```
         Return      Risk
RNG    0.893126  0.613340
MSFT   0.480025  0.375512
LOGM   0.094015  0.279553
GOOGL  0.283538  0.340807
ZM     1.287245  0.681089
```

[26]:
```
import itertools

colors = itertools.cycle(["r", "b", "g"])

tradeoff.plot(x = "Risk", y = "Return", kind = "scatter", figsize = (13,9), s =␣
 ↪20, fontsize = 15, c='g')
for i in tradeoff.index:
    plt.annotate(i, xy=(tradeoff.loc[i, "Risk"]+0.002, tradeoff.loc[i,␣
 ↪"Return"]+0.002), size = 15)
plt.xlabel("Annual Risk", fontsize = 15)
plt.ylabel("Annual Return", fontsize = 15)
plt.title("Return vs. Risk for " + title + " Stocks", fontsize = 20)
plt.show()
```



[27]:
```
rest_rets = rets.corr()
pair_value = rest_rets.abs().unstack()
pair_value.sort_values(ascending = False)
```

[27]:
```
ZM     ZM       1.000000
GOOGL  GOOGL    1.000000
MSFT   MSFT     1.000000
LOGM   LOGM     1.000000
RNG    RNG      1.000000
MSFT   GOOGL    0.839383
GOOGL  MSFT     0.839383
RNG    MSFT     0.465091
MSFT   RNG      0.465091
GOOGL  LOGM     0.456610
LOGM   GOOGL    0.456610
       MSFT     0.439389
MSFT   LOGM     0.439389
GOOGL  RNG      0.389116
RNG    GOOGL    0.389116
       LOGM     0.360740
LOGM   RNG      0.360740
RNG    ZM       0.271690
ZM     RNG      0.271690
       LOGM     0.112991
LOGM   ZM       0.112991
MSFT   ZM       0.101311
ZM     MSFT     0.101311
GOOGL  ZM       0.093773
ZM     GOOGL    0.093773
dtype: float64
```

[28]:
```
# Normalized Returns Data
Normalized_Value = ((rets[:] - rets[:].min()) /(rets[:].max() - rets[:].min()))
Normalized_Value.head()
```

[28]:

Date	RNG	MSFT	LOGM	GOOGL	ZM
2019-05-02	0.432442	0.463916	0.542931	0.520069	0.507863
2019-05-03	0.492252	0.582624	0.577710	0.640305	0.537419
2019-05-06	0.448946	0.488922	0.558338	0.562841	0.375787
2019-05-07	0.371690	0.438140	0.423277	0.489820	0.240100
2019-05-08	0.419556	0.508742	0.518292	0.515129	0.565629

[29]:
```
Normalized_Value.corr()
```

[29]:

	RNG	MSFT	LOGM	GOOGL	ZM
RNG	1.000000	0.465091	0.360740	0.389116	0.271690

```
MSFT   0.465091  1.000000  0.439389  0.839383  0.101311
LOGM   0.360740  0.439389  1.000000  0.456610  0.112991
GOOGL  0.389116  0.839383  0.456610  1.000000  0.093773
ZM     0.271690  0.101311  0.112991  0.093773  1.000000
```

[30]:

```python
normalized_rets = Normalized_Value.corr()
normalized_pair_value = normalized_rets.abs().unstack()
normalized_pair_value.sort_values(ascending = False)
```

[30]:

```
ZM     ZM       1.000000
GOOGL  GOOGL    1.000000
MSFT   MSFT     1.000000
LOGM   LOGM     1.000000
RNG    RNG      1.000000
MSFT   GOOGL    0.839383
GOOGL  MSFT     0.839383
RNG    MSFT     0.465091
MSFT   RNG      0.465091
GOOGL  LOGM     0.456610
LOGM   GOOGL    0.456610
       MSFT     0.439389
MSFT   LOGM     0.439389
GOOGL  RNG      0.389116
RNG    GOOGL    0.389116
       LOGM     0.360740
LOGM   RNG      0.360740
RNG    ZM       0.271690
ZM     RNG      0.271690
       LOGM     0.112991
LOGM   ZM       0.112991
MSFT   ZM       0.101311
ZM     MSFT     0.101311
GOOGL  ZM       0.093773
ZM     GOOGL    0.093773
dtype: float64
```

[31]:

```python
print("Stock returns: ")
print(rets.mean())
print('-' * 50)
print("Stock risks:")
print(rets.std())
```

```
Stock returns:
RNG      0.003544
MSFT     0.001905
LOGM     0.000373
GOOGL    0.001125
```

```
ZM       0.005108
dtype: float64
--------------------------------------------------
Stock risks:
RNG      0.038637
MSFT     0.023655
LOGM     0.017610
GOOGL    0.021469
ZM       0.042905
dtype: float64
```

[32]:
```
table = pd.DataFrame()
table['Returns'] = rets.mean()
table['Risk'] = rets.std()
table.sort_values(by='Returns')
```

[32]:

	Returns	Risk
LOGM	0.000373	0.017610
GOOGL	0.001125	0.021469
MSFT	0.001905	0.023655
RNG	0.003544	0.038637
ZM	0.005108	0.042905

[33]:
```
table.sort_values(by='Risk')
```

[33]:

	Returns	Risk
LOGM	0.000373	0.017610
GOOGL	0.001125	0.021469
MSFT	0.001905	0.023655
RNG	0.003544	0.038637
ZM	0.005108	0.042905

[34]:
```
rf = 0.01
table['Sharpe Ratio'] = (table['Returns'] - rf) / table['Risk']
table
```

[34]:

	Returns	Risk	Sharpe Ratio
RNG	0.003544	0.038637	-0.167091
MSFT	0.001905	0.023655	-0.342217
LOGM	0.000373	0.017610	-0.546668
GOOGL	0.001125	0.021469	-0.413384
ZM	0.005108	0.042905	-0.114018

[35]:
```
table['Max Returns'] = rets.max()
```

[36]:
```
table['Min Returns'] = rets.min()
```

[37]:
```
table['Median Returns'] = rets.median()
```

[38]:
```
total_return = stock_rets[-1:].transpose()
table['Total Return'] = 100 * total_return
table
```

[38]:
```
        Returns      Risk  Sharpe Ratio  Max Returns  Min Returns  \
RNG    0.003544  0.038637     -0.167091     0.280383    -0.204124
MSFT   0.001905  0.023655     -0.342217     0.142169    -0.147390
LOGM   0.000373  0.017610     -0.546668     0.106543    -0.119537
GOOGL  0.001125  0.021469     -0.413384     0.096202    -0.116342
ZM     0.005108  0.042905     -0.114018     0.222214    -0.152795

       Median Returns  Total Return
RNG          0.001670      0.658622
MSFT         0.001868      2.327136
LOGM         0.000000      0.034907
GOOGL        0.001248      2.048414
ZM           0.001994      6.281303
```

[39]:
```
table['Average Return Days'] = (1 + total_return)**(1 / days) - 1
table
```

[39]:
```
        Returns      Risk  Sharpe Ratio  Max Returns  Min Returns  \
RNG    0.003544  0.038637     -0.167091     0.280383    -0.204124
MSFT   0.001905  0.023655     -0.342217     0.142169    -0.147390
LOGM   0.000373  0.017610     -0.546668     0.106543    -0.119537
GOOGL  0.001125  0.021469     -0.413384     0.096202    -0.116342
ZM     0.005108  0.042905     -0.114018     0.222214    -0.152795

       Median Returns  Total Return  Average Return Days
RNG          0.001670      0.658622         1.376242e-05
MSFT         0.001868      2.327136         4.822908e-05
LOGM         0.000000      0.034907         7.316683e-07
GOOGL        0.001248      2.048414         4.251069e-05
ZM           0.001994      6.281303         1.277214e-04
```

[40]:
```
initial_value = df.iloc[0]
ending_value = df.iloc[-1]
table['CAGR'] = ((ending_value / initial_value) ** (252.0 / days)) -1
table
```

[40]:
```
        Returns      Risk  Sharpe Ratio  Max Returns  Min Returns  \
RNG    0.003544  0.038637     -0.167091     0.280383    -0.204124
MSFT   0.001905  0.023655     -0.342217     0.142169    -0.147390
LOGM   0.000373  0.017610     -0.546668     0.106543    -0.119537
GOOGL  0.001125  0.021469     -0.413384     0.096202    -0.116342
```

```
ZM     0.005108  0.042905     -0.114018     0.222214    -0.152795

       Median Returns  Total Return  Average Return Days      CAGR
RNG          0.001670      0.658622         1.376242e-05  0.632221
MSFT         0.001868      2.327136         4.822908e-05  0.327281
LOGM         0.000000      0.034907         7.316683e-07  0.038991
GOOGL        0.001248      2.048414         4.251069e-05  0.168780
ZM           0.001994      6.281303         1.277214e-04  1.078707
```

[41]:
```python
table.sort_values(by='Average Return Days')
```

[41]:
```
        Returns      Risk  Sharpe Ratio  Max Returns  Min Returns  \
LOGM   0.000373  0.017610     -0.546668     0.106543    -0.119537
RNG    0.003544  0.038637     -0.167091     0.280383    -0.204124
GOOGL  0.001125  0.021469     -0.413384     0.096202    -0.116342
MSFT   0.001905  0.023655     -0.342217     0.142169    -0.147390
ZM     0.005108  0.042905     -0.114018     0.222214    -0.152795

       Median Returns  Total Return  Average Return Days      CAGR
LOGM         0.000000      0.034907         7.316683e-07  0.038991
RNG          0.001670      0.658622         1.376242e-05  0.632221
GOOGL        0.001248      2.048414         4.251069e-05  0.168780
MSFT         0.001868      2.327136         4.822908e-05  0.327281
ZM           0.001994      6.281303         1.277214e-04  1.078707
```