

Online_Gaming_Portfolio

September 29, 2021

1 Online Gaming

```
[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
# Online Gaming
title = "Online Gaming"
symbols = ['EA', 'NTDOY', 'ESPO', 'IGGGF', 'SCPL', 'TTWO', 'ATVI', 'ZNGA', 'NEXOF', 'CZR', 'YY', 'CHDN', 'MOMO', 'IGT', 'GLUU', 'CYOU', 'SOHU', 'CMC']
start = '2018-01-01'
end = '2020-06-26'
```

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

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[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?
2 years

```

[5]: number_of_years = delta.years

```

```

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

```

[6]: 905

```

[7]: df.head()

```

```

[7]:
      EA      NTDOY  ESPO      IGGGF  SCPL      TTWO  \
Date
2018-01-02  109.449997  44.045223   NaN  0.825251   NaN  112.879997
2018-01-03  109.750000  45.043194   NaN  0.825251   NaN  113.879997
2018-01-04  107.190002  46.578537   NaN  0.825251   NaN  114.019997
2018-01-05  112.389999  45.513390   NaN  0.825251   NaN  116.910004
2018-01-08  113.220001  45.647736   NaN  0.825251   NaN  117.370003

      ATVI  ZNGA      NEXOF  CZR      YY      CHDN  \
Date
2018-01-02  63.055592  3.92  12.058393  12.45  121.459999  78.517570
2018-01-03  64.036087  4.02  12.058393  12.48  119.360001  78.451607
2018-01-04  63.398773  3.89  12.058393  12.90  121.930000  78.039307
2018-01-05  65.075409  3.89  12.058393  12.85  128.100006  79.012321
2018-01-08  65.330338  3.91  12.058393  12.65  129.270004  79.177246

      MOMO      IGT  GLUU      CYOU      SOHU      CMC

```

Date							
2018-01-02	24.564751	23.521132	3.63	12.266425	45.580002	21.397432	
2018-01-03	24.602745	23.406864	3.65	12.136746	44.990002	22.835211	
2018-01-04	25.524164	23.644188	3.67	12.070243	45.240002	23.004358	
2018-01-05	26.436077	24.408888	3.81	11.930589	46.410000	23.399038	
2018-01-08	26.540569	24.259468	3.80	12.236500	46.820000	23.756136	

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

```
[8]:
```

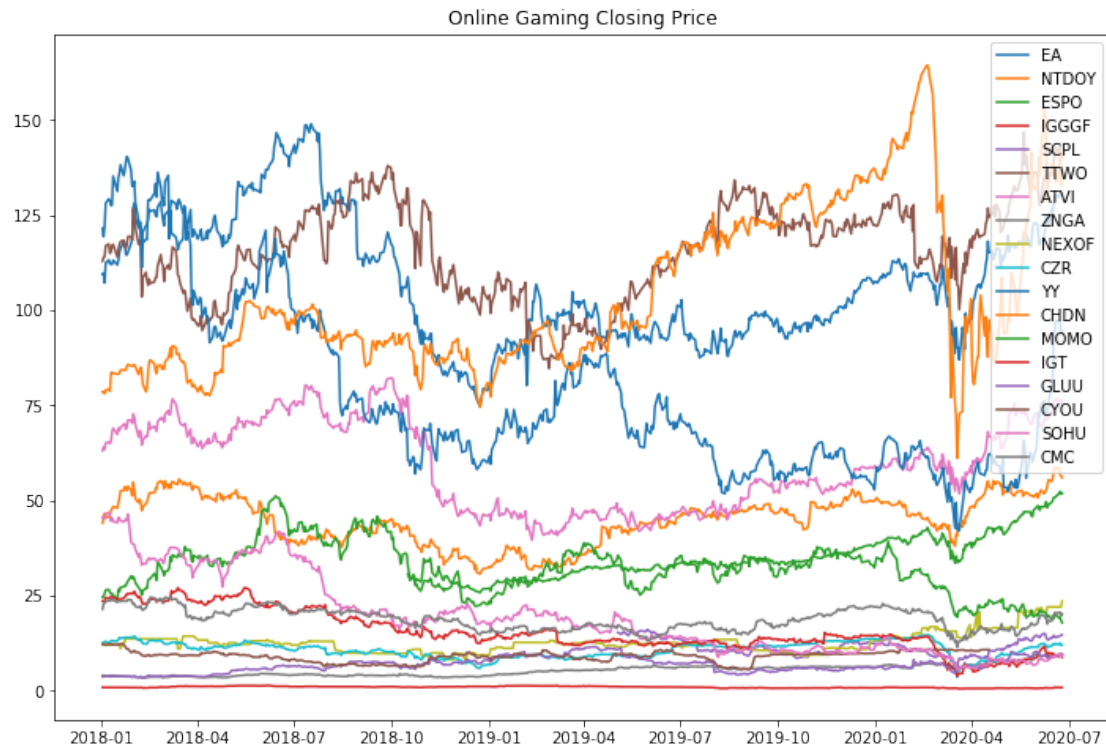
	EA	NTDOY	ESPO	IGGGF	SCPL	TTWO \
Date						
2020-06-19	130.190002	58.590000	50.959999	0.80000	13.96	142.610001
2020-06-22	129.720001	58.500000	51.790001	0.82500	14.25	141.139999
2020-06-23	130.600006	56.820000	52.310001	0.78500	14.37	143.369995
2020-06-24	130.869995	56.439999	51.630001	0.79496	14.54	139.869995
2020-06-25	130.740005	55.930000	51.820000	0.79000	14.66	140.399994

	ATVI	ZNGA	NEXOF	CZR	YY	CHDN \
Date						
2020-06-19	76.580002	9.29	21.980000	12.28	97.230003	133.509995
2020-06-22	76.120003	9.44	21.980000	12.09	97.129997	135.750000
2020-06-23	76.449997	9.57	21.980000	12.45	96.980003	141.699997
2020-06-24	75.580002	9.48	21.980000	12.05	93.629997	132.690002
2020-06-25	76.209999	9.61	23.549999	11.95	94.370003	133.949997

	MOMO	IGT	GLUU	CYOU	SOHU	CMC
Date						
2020-06-19	19.969999	9.08	9.31	NaN	9.38	20.299999
2020-06-22	19.139999	8.91	9.27	NaN	9.33	20.580000
2020-06-23	19.219999	9.47	9.48	NaN	9.68	20.549999
2020-06-24	18.459999	9.07	9.25	NaN	9.02	19.639999
2020-06-25	17.820000	8.78	9.41	NaN	9.38	20.180000

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

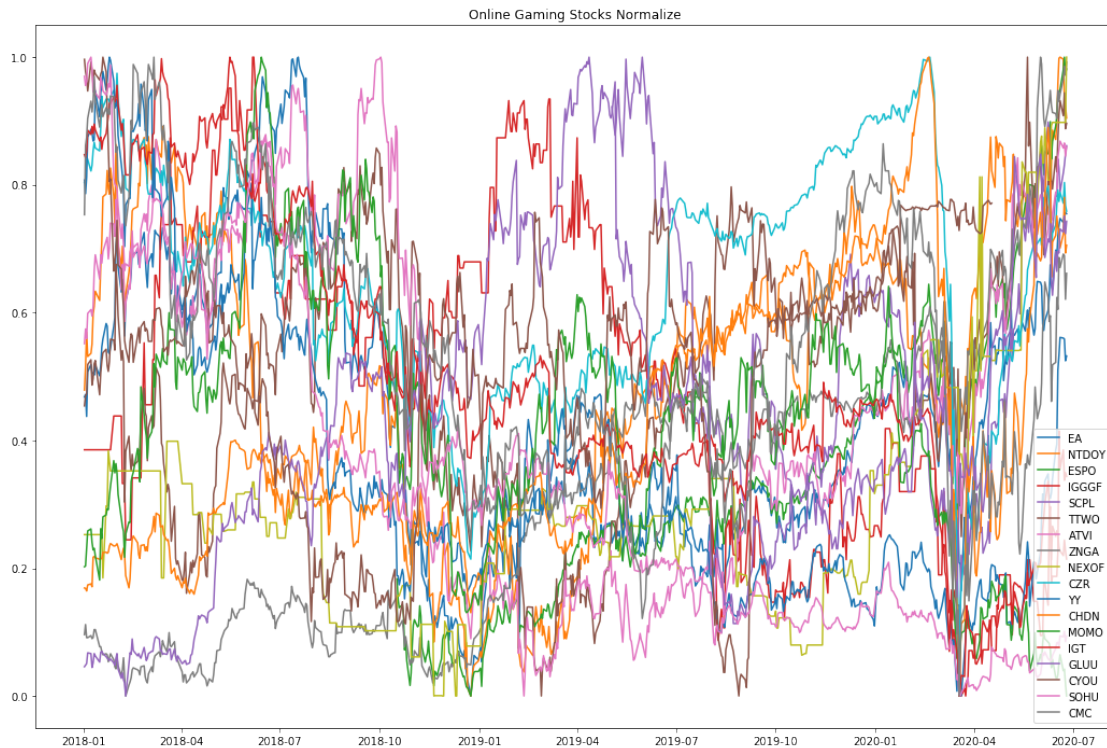
```
[9]: <matplotlib.legend.Legend at 0x233687c8160>
```



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

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

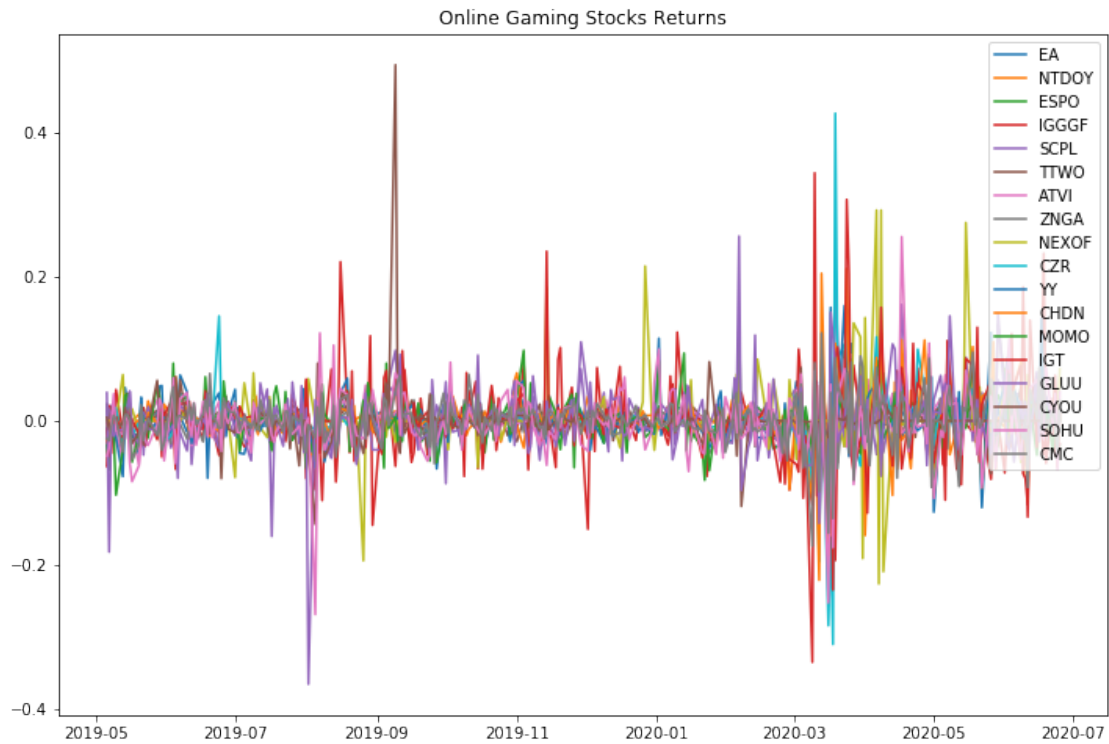
```
[11]: <matplotlib.legend.Legend at 0x233697cfef0>
```



```
[12]: stock_returns = df.pct_change().dropna()
```

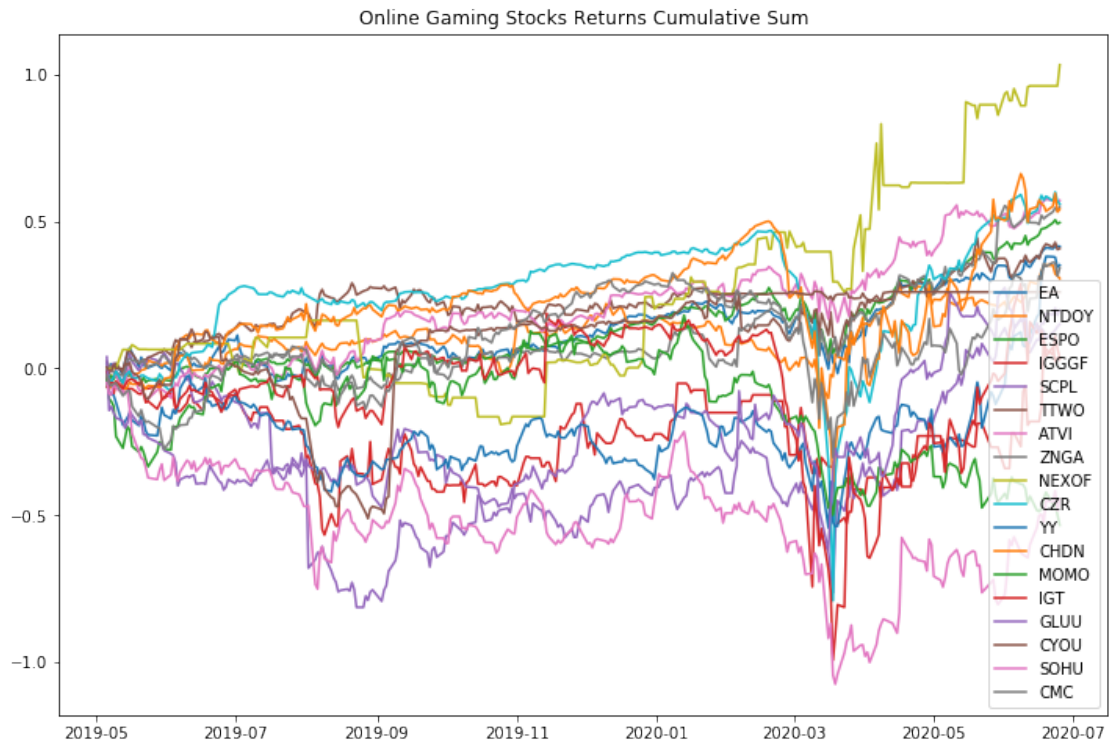
```
[13]: plt.figure(figsize=(12,8))
plt.plot(stock_returns)
plt.title(title + ' Stocks Returns')
plt.legend(labels=stock_returns.columns)
```

```
[13]: <matplotlib.legend.Legend at 0x23369862898>
```



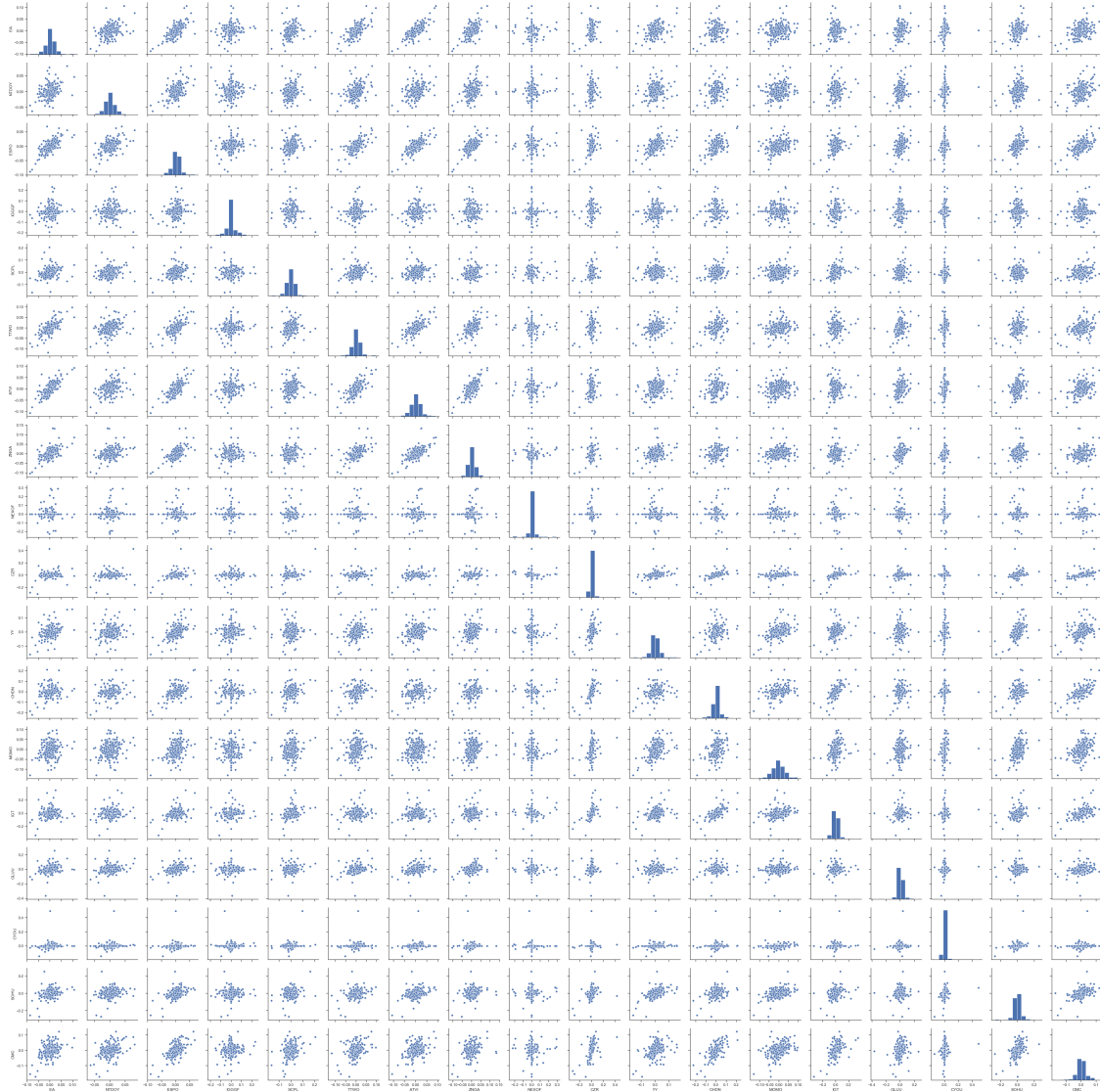
```
[14]: plt.figure(figsize=(12,8))
plt.plot(stock_rets.cumsum())
plt.title(title + ' Stocks Returns Cumulative Sum')
plt.legend(labels=stock_rets.columns)
```

[14]: <matplotlib.legend.Legend at 0x233698e9b00>

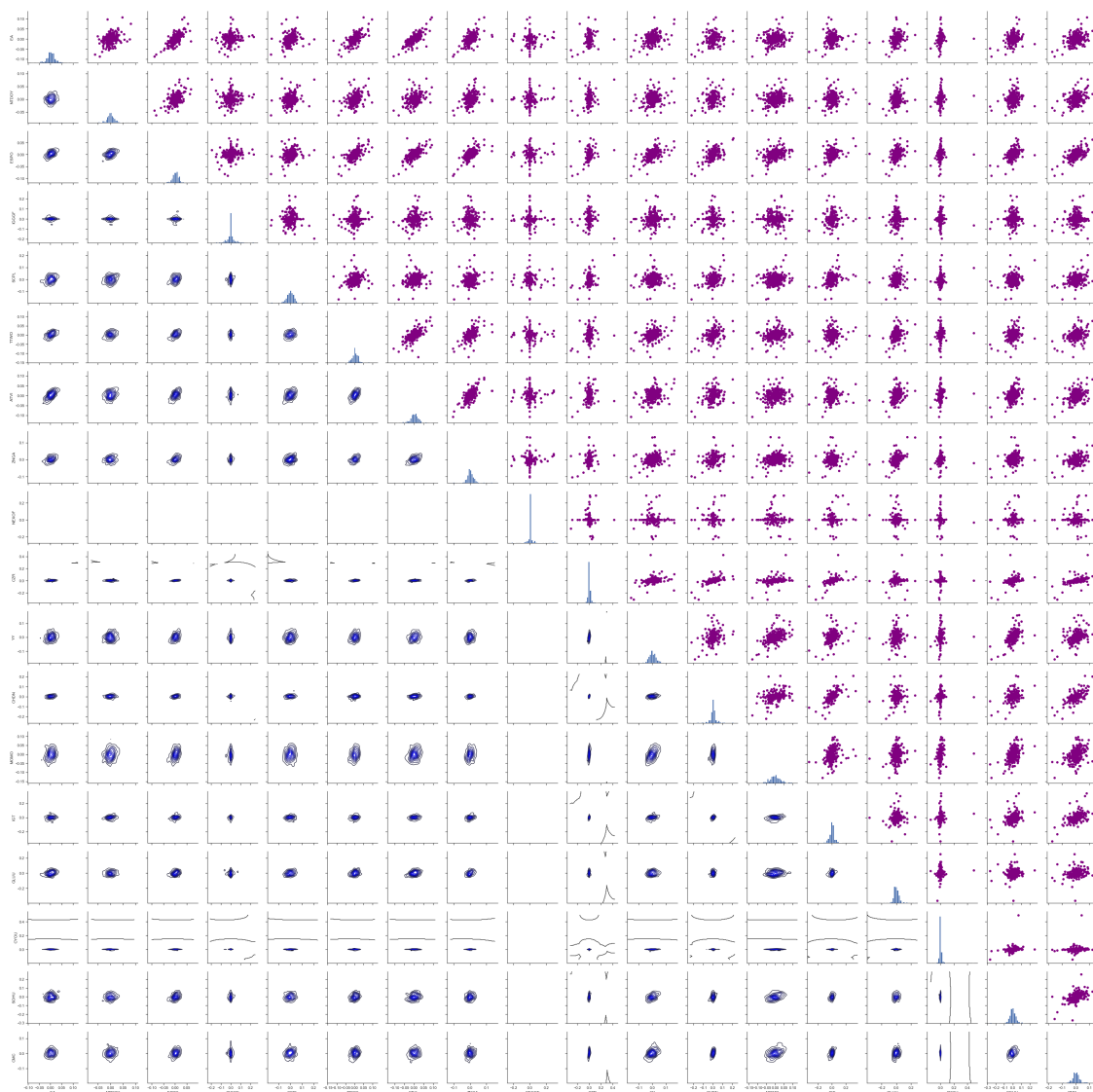


```
[15]: sns.set(style='ticks')
ax = sns.pairplot(stock_rets, diag_kind='hist')

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)
```



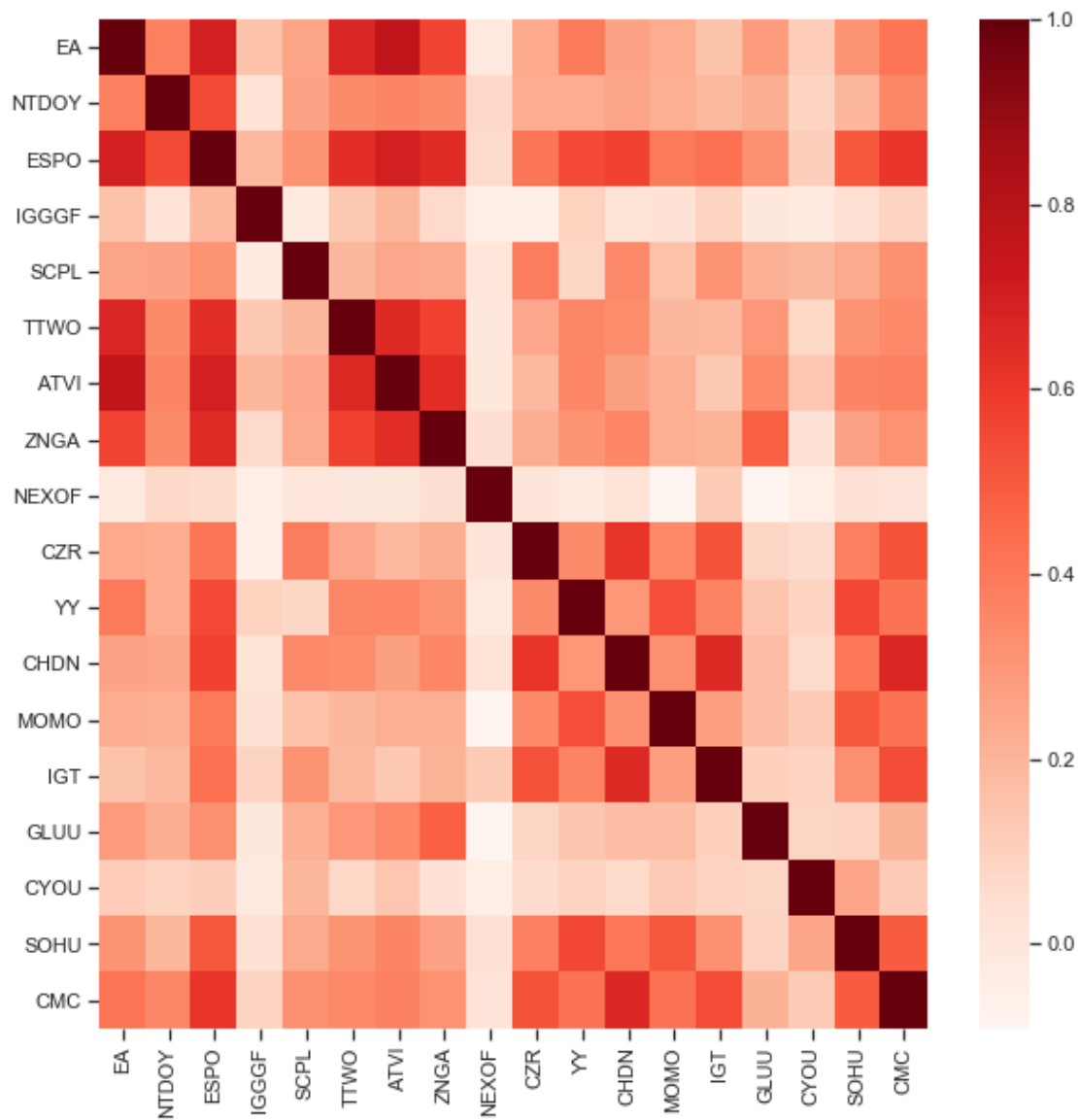
```
[16]: ax = sns.PairGrid(stock_rets)
ax.map_upper(plt.scatter, color='purple')
ax.map_lower(sns.kdeplot, color='blue')
ax.map_diag(plt.hist, bins=30)
for i in range(nplot) :
    for j in range(nplot) :
        ax.axes[i, j].locator_params(axis='x', nbins=6, tight=True)
```

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

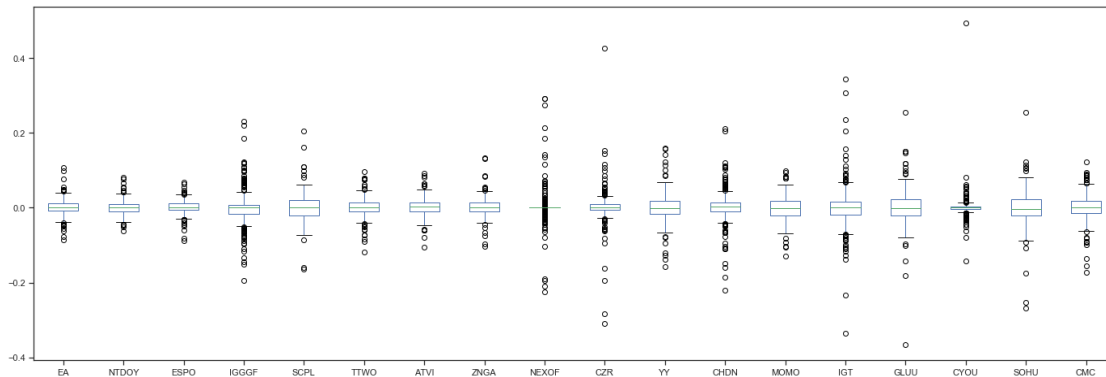
      # plot the heatmap
      sns.heatmap(corr,
                  xticklabels=corr.columns,
                  yticklabels=corr.columns,
                  cmap="Reds")
```

```
[17]: <matplotlib.axes._subplots.AxesSubplot at 0x233687ec208>
```



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

```
[18]: <matplotlib.axes._subplots.AxesSubplot at 0x23375f7afd0>
```

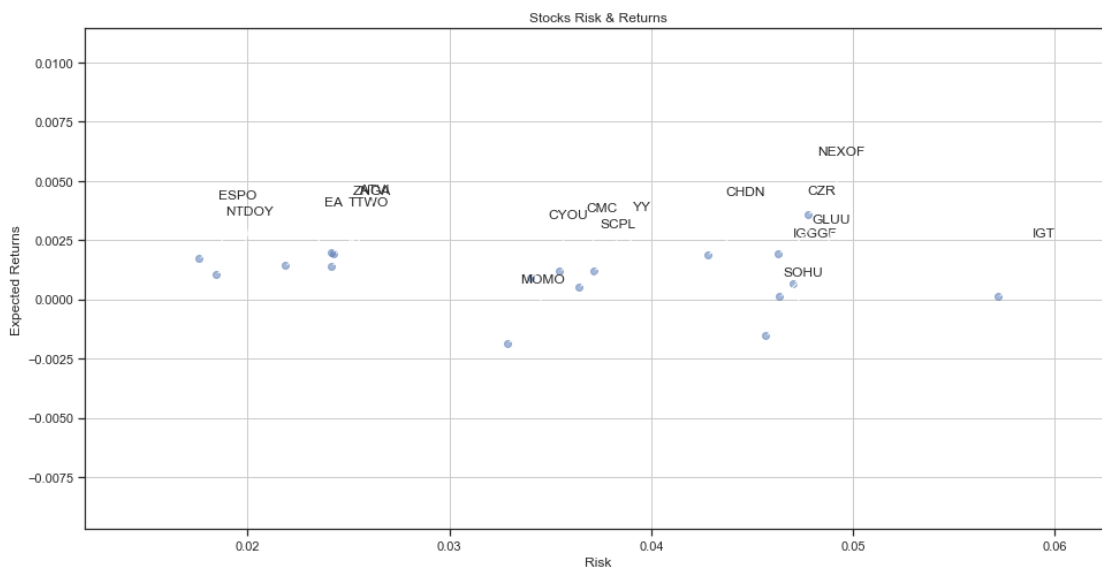


```
[19]: rets = stock_rets.dropna()

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')

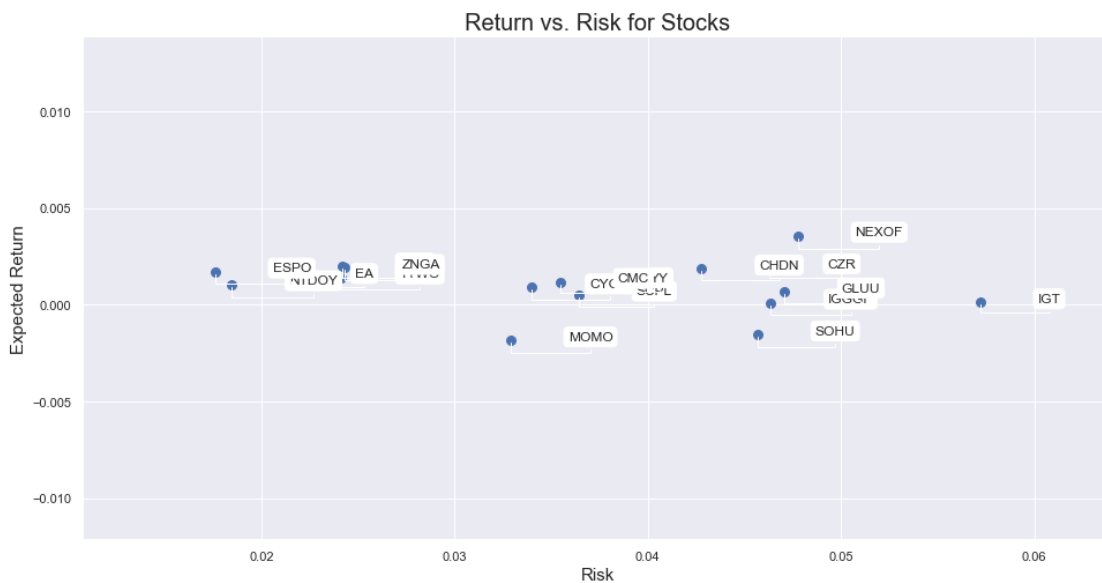
for label, x, y in zip(rets.columns, rets.std(), rets.mean()):
    plt.annotate(
        label,
        xy = (x, y), xytext = (50, 50),
        textcoords = 'offset points', ha = 'right', va = 'bottom',
        arrowprops = dict(arrowstyle = '-', connectionstyle = 'arc3,rad=-0.3'))
```



```
[20]: 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"))
```



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

```
[21]: CMC      CMC      1.000000
NEXOF    NEXOF      1.000000
GLUU     GLUU      1.000000
IGT      IGT       1.000000
MOMO     MOMO      1.000000
```

CHDN	CHDN	1.000000
YY	YY	1.000000
CZR	CZR	1.000000
ZNGA	ZNGA	1.000000
SOHU	SOHU	1.000000
ATVI	ATVI	1.000000
TTWO	TTWO	1.000000
SCPL	SCPL	1.000000
IGGGF	IGGGF	1.000000
ESPO	ESPO	1.000000
NTDOY	NTDOY	1.000000
CYOU	CYOU	1.000000
EA	EA	1.000000
	ATVI	0.769795
ATVI	EA	0.769795
ESPO	EA	0.700928
EA	ESPO	0.700928
ATVI	ESPO	0.700343
ESPO	ATVI	0.700343
TTWO	EA	0.672437
EA	TTWO	0.672437
CMC	CHDN	0.669305
CHDN	CMC	0.669305
IGT	CHDN	0.663151
CHDN	IGT	0.663151
	...	
MOMO	IGGGF	0.035994
IGGGF	MOMO	0.035994
CYOU	ZNGA	0.034611
ZNGA	CYOU	0.034611
IGGGF	NTDOY	0.029423
NTDOY	IGGGF	0.029423
IGGGF	CHDN	0.027796
CHDN	IGGGF	0.027796
	NEXOF	0.027594
NEXOF	CHDN	0.027594
CMC	NEXOF	0.023054
NEXOF	CMC	0.023054
SCPL	IGGGF	0.016811
IGGGF	SCPL	0.016811
	CYOU	0.016021
CYOU	IGGGF	0.016021
NEXOF	CZR	0.015009
CZR	NEXOF	0.015009
NEXOF	YY	0.014615
YY	NEXOF	0.014615
NEXOF	EA	0.011146

```

EA      NEXOF    0.011146
SCPL    NEXOF    0.009949
NEXOF   SCPL     0.009949
IGGGF   GLUU     0.004558
GLUU    IGGGF    0.004558
TTWO    NEXOF    0.004274
NEXOF   TTWO     0.004274
ATVI    NEXOF    0.003669
NEXOF   ATVI     0.003669
Length: 324, dtype: float64

```

```

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

```

```

[22]:
           EA      NTDOY      ESPO      IGGGF      SCPL      TTWO  \
Date
2019-05-06  0.518219  0.409265  0.504491  0.306879  0.369190  0.552440
2019-05-07  0.390781  0.177646  0.396872  0.504326  0.480122  0.470107
2019-05-08  0.511900  0.558324  0.638220  0.454945  0.503106  0.640910
2019-05-09  0.416781  0.365847  0.475347  0.348541  0.477204  0.565225
2019-05-10  0.478751  0.539276  0.668463  0.556262  0.373956  0.608435

           ATVI      ZNGA      NEXOF      CZR      YY      CHDN  \
Date
2019-05-06  0.645066  0.534552  0.436324  0.406431  0.400695  0.449707
2019-05-07  0.381810  0.382295  0.436324  0.388646  0.345438  0.417084
2019-05-08  0.552075  0.402307  0.436324  0.404411  0.472605  0.522121
2019-05-09  0.517529  0.367187  0.436324  0.446860  0.483452  0.541619
2019-05-10  0.469833  0.436855  0.436324  0.444881  0.422747  0.518846

           MOMO      IGT      GLUU      CYOU      SOHU      CMC
Date
2019-05-06  0.419356  0.477271  0.650554  0.232529  0.419138  0.506156
2019-05-07  0.270575  0.420012  0.295015  0.205221  0.440428  0.494285
2019-05-08  0.525809  0.511637  0.608965  0.226088  0.507522  0.562286
2019-05-09  0.501216  0.489164  0.553264  0.256949  0.583919  0.612975
2019-05-10  0.118767  0.501903  0.561354  0.206170  0.485495  0.598652

```

```

[23]: Normalized_Value.corr()

```

```

[23]:
           EA      NTDOY      ESPO      IGGGF      SCPL      TTWO      ATVI  \
EA      1.000000  0.380182  0.700928  0.157182  0.259232  0.672437  0.769795
NTDOY   0.380182  1.000000  0.545280  0.029423  0.266442  0.341888  0.361275
ESPO    0.700928  0.545280  1.000000  0.188304  0.310329  0.641774  0.700343
IGGGF   0.157182  0.029423  0.188304  1.000000 -0.016811  0.131509  0.200993
SCPL    0.259232  0.266442  0.310329 -0.016811  1.000000  0.192145  0.248373

```

TTWO	0.672437	0.341888	0.641774	0.131509	0.192145	1.000000	0.661742
ATVI	0.769795	0.361275	0.700343	0.200993	0.248373	0.661742	1.000000
ZNGA	0.567288	0.340067	0.652942	0.070299	0.240408	0.576547	0.643923
NEXOF	-0.011146	0.074306	0.058710	-0.042531	0.009949	-0.004274	0.003669
CZR	0.245238	0.232519	0.415085	-0.051777	0.389056	0.246298	0.187088
YY	0.400390	0.230017	0.551762	0.099707	0.080781	0.354249	0.357106
CHDN	0.266890	0.258081	0.573559	0.027796	0.344550	0.336688	0.273186
MOMO	0.232537	0.220835	0.400842	0.035994	0.156615	0.193331	0.222235
IGT	0.153463	0.189643	0.430467	0.092622	0.316277	0.189039	0.134534
GLUU	0.288126	0.227081	0.330736	0.004558	0.219720	0.300207	0.347538
CYOU	0.116331	0.091222	0.110731	-0.016021	0.202341	0.075384	0.140093
SOHU	0.310074	0.200619	0.506717	0.042983	0.240681	0.310798	0.364271
CMC	0.417896	0.355022	0.619716	0.093465	0.323571	0.352125	0.374468

	ZNGA	NEXOF	CZR	YY	CHDN	MOMO	IGT \
EA	0.567288	-0.011146	0.245238	0.400390	0.266890	0.232537	0.153463
NTDOY	0.340067	0.074306	0.232519	0.230017	0.258081	0.220835	0.189643
ESPO	0.652942	0.058710	0.415085	0.551762	0.573559	0.400842	0.430467
IGGGF	0.070299	-0.042531	-0.051777	0.099707	0.027796	0.035994	0.092622
SCPL	0.240408	0.009949	0.389056	0.080781	0.344550	0.156615	0.316277
TTWO	0.576547	-0.004274	0.246298	0.354249	0.336688	0.193331	0.189039
ATVI	0.643923	0.003669	0.187088	0.357106	0.273186	0.222235	0.134534
ZNGA	1.000000	0.046448	0.227537	0.311999	0.357178	0.221526	0.205244
NEXOF	0.046448	1.000000	0.015009	-0.014615	0.027594	-0.091048	0.124332
CZR	0.227537	0.015009	1.000000	0.340210	0.616646	0.349485	0.524989
YY	0.311999	-0.014615	0.340210	1.000000	0.304584	0.537409	0.365797
CHDN	0.357178	0.027594	0.616646	0.304584	1.000000	0.327434	0.663151
MOMO	0.221526	-0.091048	0.349485	0.537409	0.327434	1.000000	0.275994
IGT	0.205244	0.124332	0.524989	0.365797	0.663151	0.275994	1.000000
GLUU	0.481572	-0.087753	0.086707	0.144579	0.176078	0.174447	0.103231
CYOU	0.034611	-0.043627	0.061350	0.096067	0.070140	0.128068	0.093920
SOHU	0.267029	0.037308	0.378445	0.555499	0.408144	0.509014	0.330625
CMC	0.321260	0.023054	0.522939	0.422024	0.669305	0.420954	0.542689

	GLUU	CYOU	SOHU	CMC
EA	0.288126	0.116331	0.310074	0.417896
NTDOY	0.227081	0.091222	0.200619	0.355022
ESPO	0.330736	0.110731	0.506717	0.619716
IGGGF	0.004558	-0.016021	0.042983	0.093465
SCPL	0.219720	0.202341	0.240681	0.323571
TTWO	0.300207	0.075384	0.310798	0.352125
ATVI	0.347538	0.140093	0.364271	0.374468
ZNGA	0.481572	0.034611	0.267029	0.321260
NEXOF	-0.087753	-0.043627	0.037308	0.023054
CZR	0.086707	0.061350	0.378445	0.522939
YY	0.144579	0.096067	0.555499	0.422024
CHDN	0.176078	0.070140	0.408144	0.669305

MOMO	0.174447	0.128068	0.509014	0.420954
IGT	0.103231	0.093920	0.330625	0.542689
GLUU	1.000000	0.087568	0.094780	0.214551
CYOU	0.087568	1.000000	0.255068	0.129624
SOHU	0.094780	0.255068	1.000000	0.494771
CMC	0.214551	0.129624	0.494771	1.000000

```
[24]: normalized_rets = Normalized_Value.corr()
normalized_pair_value = normalized_rets.abs().unstack()
normalized_pair_value.sort_values(ascending = False)
```

```
[24]: CMC      CMC      1.000000
NEXOF    NEXOF      1.000000
GLUU     GLUU      1.000000
IGT      IGT       1.000000
MOMO     MOMO      1.000000
CHDN     CHDN      1.000000
YY       YY        1.000000
CZR      CZR       1.000000
ZNGA     ZNGA      1.000000
SOHU     SOHU      1.000000
ATVI     ATVI      1.000000
TTWO     TTWO      1.000000
SCPL     SCPL      1.000000
IGGGF    IGGGF     1.000000
ESPO     ESPO      1.000000
NTDOY    NTDOY     1.000000
CYOU     CYOU      1.000000
EA       EA        1.000000
          ATVI      0.769795
ATVI     EA        0.769795
ESPO     EA        0.700928
EA       ESPO      0.700928
ATVI     ESPO      0.700343
ESPO     ATVI      0.700343
TTWO     EA        0.672437
EA       TTWO      0.672437
CMC      CHDN      0.669305
CHDN     CMC       0.669305
IGT      CHDN      0.663151
CHDN     IGT       0.663151
          ...
MOMO     IGGGF     0.035994
IGGGF    MOMO      0.035994
CYOU     ZNGA      0.034611
ZNGA     CYOU      0.034611
IGGGF    NTDOY     0.029423
```


NTDOY	IGGGF	0.029423
IGGGF	CHDN	0.027796
CHDN	IGGGF	0.027796
	NEXOF	0.027594
NEXOF	CHDN	0.027594
CMC	NEXOF	0.023054
NEXOF	CMC	0.023054
SCPL	IGGGF	0.016811
IGGGF	SCPL	0.016811
	CYOU	0.016021
CYOU	IGGGF	0.016021
NEXOF	CZR	0.015009
CZR	NEXOF	0.015009
NEXOF	YY	0.014615
YY	NEXOF	0.014615
NEXOF	EA	0.011146
EA	NEXOF	0.011146
SCPL	NEXOF	0.009949
NEXOF	SCPL	0.009949
IGGGF	GLUU	0.004558
GLUU	IGGGF	0.004558
TTWO	NEXOF	0.004274
NEXOF	TTWO	0.004274
ATVI	NEXOF	0.003669
NEXOF	ATVI	0.003669

Length: 324, dtype: float64

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

Stock returns:

EA	0.001435
NTDOY	0.001058
ESPO	0.001715
IGGGF	0.000105
SCPL	0.000520
TTWO	0.001412
ATVI	0.001977
ZNGA	0.001905
NEXOF	0.003572
CZR	0.001935
YY	0.001216
CHDN	0.001872
MOMO	-0.001844

```

IGT      0.000121
GLUU     0.000685
CYOU     0.000899
SOHU     -0.001541
CMC      0.001184
dtype: float64

```

Stock risks:

```

EA      0.021852
NTDOY   0.018443
ESPO    0.017587
IGGGF   0.046357
SCPL    0.036414
TTWO    0.024151
ATVI    0.024156
ZNGA    0.024281
NEXOF   0.047753
CZR     0.046313
YY      0.037137
CHDN    0.042783
MOMO    0.032884
IGT     0.057194
GLUU    0.047045
CYOU    0.033995
SOHU    0.045675
CMC     0.035453
dtype: float64

```

```

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

```

```

[26]:
      Returns      Risk
MOMO -0.001844  0.032884
SOHU -0.001541  0.045675
IGGGF 0.000105  0.046357
IGT   0.000121  0.057194
SCPL  0.000520  0.036414
GLUU  0.000685  0.047045
CYOU  0.000899  0.033995
NTDOY 0.001058  0.018443
CMC   0.001184  0.035453
YY    0.001216  0.037137
TTWO  0.001412  0.024151
EA    0.001435  0.021852
ESPO  0.001715  0.017587

```

CHDN	0.001872	0.042783
ZNGA	0.001905	0.024281
CZR	0.001935	0.046313
ATVI	0.001977	0.024156
NEXOF	0.003572	0.047753

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

```
[27]:
```

	Returns	Risk
ESPO	0.001715	0.017587
NTDOY	0.001058	0.018443
EA	0.001435	0.021852
TTWO	0.001412	0.024151
ATVI	0.001977	0.024156
ZNGA	0.001905	0.024281
MOMO	-0.001844	0.032884
CYOU	0.000899	0.033995
CMC	0.001184	0.035453
SCPL	0.000520	0.036414
YY	0.001216	0.037137
CHDN	0.001872	0.042783
SOHU	-0.001541	0.045675
CZR	0.001935	0.046313
IGGGF	0.000105	0.046357
GLUU	0.000685	0.047045
NEXOF	0.003572	0.047753
IGT	0.000121	0.057194

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

```
[28]:
```

	Returns	Risk	Sharpe Ratio
EA	0.001435	0.021852	-0.391945
NTDOY	0.001058	0.018443	-0.484861
ESPO	0.001715	0.017587	-0.471083
IGGGF	0.000105	0.046357	-0.213455
SCPL	0.000520	0.036414	-0.260332
TTWO	0.001412	0.024151	-0.355602
ATVI	0.001977	0.024156	-0.332144
ZNGA	0.001905	0.024281	-0.333407
NEXOF	0.003572	0.047753	-0.134616
CZR	0.001935	0.046313	-0.174138
YY	0.001216	0.037137	-0.236529
CHDN	0.001872	0.042783	-0.189973
MOMO	-0.001844	0.032884	-0.360181
IGT	0.000121	0.057194	-0.172724

GLUU	0.000685	0.047045	-0.198003
CYOU	0.000899	0.033995	-0.267723
SOHU	-0.001541	0.045675	-0.252671
CMC	0.001184	0.035453	-0.248680

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

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

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

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

```
[32]:
```

	Returns	Risk	Sharpe Ratio	Max Returns	Min Returns	\
EA	0.001435	0.021852	-0.391945	0.106649	-0.086441	
NTDOY	0.001058	0.018443	-0.484861	0.080611	-0.062846	
ESPO	0.001715	0.017587	-0.471083	0.068273	-0.088411	
IGGGF	0.000105	0.046357	-0.213455	0.231884	-0.193548	
SCPL	0.000520	0.036414	-0.260332	0.205047	-0.164706	
TTWO	0.001412	0.024151	-0.355602	0.096555	-0.118522	
ATVI	0.001977	0.024156	-0.332144	0.091734	-0.106369	
ZNGA	0.001905	0.024281	-0.333407	0.133829	-0.103817	
NEXOF	0.003572	0.047753	-0.134616	0.291875	-0.225931	
CZR	0.001935	0.046313	-0.174138	0.426136	-0.309804	
YY	0.001216	0.037137	-0.236529	0.159496	-0.158164	
CHDN	0.001872	0.042783	-0.189973	0.210870	-0.220975	
MOMO	-0.001844	0.032884	-0.360181	0.097575	-0.129826	
IGT	0.000121	0.057194	-0.172724	0.343471	-0.334524	
GLUU	0.000685	0.047045	-0.198003	0.255814	-0.364954	
CYOU	0.000899	0.033995	-0.267723	0.493243	-0.143426	
SOHU	-0.001541	0.045675	-0.252671	0.255072	-0.268412	
CMC	0.001184	0.035453	-0.248680	0.121392	-0.173639	

	Median Returns	Total Return
EA	0.001675	-0.099327
NTDOY	-0.000035	-0.903612
ESPO	0.001570	0.368000
IGGGF	0.000000	-0.623931
SCPL	0.000000	0.825309
TTWO	0.001277	0.378922
ATVI	0.002143	0.833550
ZNGA	0.000000	1.371309
NEXOF	0.000000	7.142856
CZR	0.001477	-0.829879
YY	-0.001029	0.790351

CHDN	0.002965	0.949578
MOMO	-0.001461	-3.466952
IGT	0.000000	-3.197354
GLUU	-0.001397	1.729728
CYOU	0.000000	0.000000
SOHU	-0.003699	3.991127
CMC	0.001536	2.749496

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

```
[33]:
```

	Returns	Risk	Sharpe Ratio	Max Returns	Min Returns	\
EA	0.001435	0.021852	-0.391945	0.106649	-0.086441	
NTDOY	0.001058	0.018443	-0.484861	0.080611	-0.062846	
ESPO	0.001715	0.017587	-0.471083	0.068273	-0.088411	
IGGGF	0.000105	0.046357	-0.213455	0.231884	-0.193548	
SCPL	0.000520	0.036414	-0.260332	0.205047	-0.164706	
TTWO	0.001412	0.024151	-0.355602	0.096555	-0.118522	
ATVI	0.001977	0.024156	-0.332144	0.091734	-0.106369	
ZNGA	0.001905	0.024281	-0.333407	0.133829	-0.103817	
NEXOF	0.003572	0.047753	-0.134616	0.291875	-0.225931	
CZR	0.001935	0.046313	-0.174138	0.426136	-0.309804	
YY	0.001216	0.037137	-0.236529	0.159496	-0.158164	
CHDN	0.001872	0.042783	-0.189973	0.210870	-0.220975	
MOMO	-0.001844	0.032884	-0.360181	0.097575	-0.129826	
IGT	0.000121	0.057194	-0.172724	0.343471	-0.334524	
GLUU	0.000685	0.047045	-0.198003	0.255814	-0.364954	
CYOU	0.000899	0.033995	-0.267723	0.493243	-0.143426	
SOHU	-0.001541	0.045675	-0.252671	0.255072	-0.268412	
CMC	0.001184	0.035453	-0.248680	0.121392	-0.173639	

	Median Returns	Total Return	Average Return Days
EA	0.001675	-0.099327	-0.000001
NTDOY	-0.000035	-0.903612	-0.000010
ESPO	0.001570	0.368000	0.000004
IGGGF	0.000000	-0.623931	-0.000007
SCPL	0.000000	0.825309	0.000009
TTWO	0.001277	0.378922	0.000004
ATVI	0.002143	0.833550	0.000009
ZNGA	0.000000	1.371309	0.000015
NEXOF	0.000000	7.142856	0.000076
CZR	0.001477	-0.829879	-0.000009
YY	-0.001029	0.790351	0.000009
CHDN	0.002965	0.949578	0.000010
MOMO	-0.001461	-3.466952	-0.000039
IGT	0.000000	-3.197354	-0.000036
GLUU	-0.001397	1.729728	0.000019

CYOU	0.000000	0.000000	0.000000
SOHU	-0.003699	3.991127	0.000043
CMC	0.001536	2.749496	0.000030

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

```
[34]:
```

	Returns	Risk	Sharpe Ratio	Max Returns	Min Returns	\
EA	0.001435	0.021852	-0.391945	0.106649	-0.086441	
NTDOY	0.001058	0.018443	-0.484861	0.080611	-0.062846	
ESPO	0.001715	0.017587	-0.471083	0.068273	-0.088411	
IGGGF	0.000105	0.046357	-0.213455	0.231884	-0.193548	
SCPL	0.000520	0.036414	-0.260332	0.205047	-0.164706	
TTWO	0.001412	0.024151	-0.355602	0.096555	-0.118522	
ATVI	0.001977	0.024156	-0.332144	0.091734	-0.106369	
ZNGA	0.001905	0.024281	-0.333407	0.133829	-0.103817	
NEXOF	0.003572	0.047753	-0.134616	0.291875	-0.225931	
CZR	0.001935	0.046313	-0.174138	0.426136	-0.309804	
YY	0.001216	0.037137	-0.236529	0.159496	-0.158164	
CHDN	0.001872	0.042783	-0.189973	0.210870	-0.220975	
MOMO	-0.001844	0.032884	-0.360181	0.097575	-0.129826	
IGT	0.000121	0.057194	-0.172724	0.343471	-0.334524	
GLUU	0.000685	0.047045	-0.198003	0.255814	-0.364954	
CYOU	0.000899	0.033995	-0.267723	0.493243	-0.143426	
SOHU	-0.001541	0.045675	-0.252671	0.255072	-0.268412	
CMC	0.001184	0.035453	-0.248680	0.121392	-0.173639	

	Median Returns	Total Return	Average Return	Days	CAGR
EA	0.001675	-0.099327	-0.000001	0.050738	
NTDOY	-0.000035	-0.903612	-0.000010	0.068780	
ESPO	0.001570	0.368000	0.000004	NaN	
IGGGF	0.000000	-0.623931	-0.000007	-0.012082	
SCPL	0.000000	0.825309	0.000009	NaN	
TTWO	0.001277	0.378922	0.000004	0.062633	
ATVI	0.002143	0.833550	0.000009	0.054177	
ZNGA	0.000000	1.371309	0.000015	0.283630	
NEXOF	0.000000	7.142856	0.000076	0.204888	
CZR	0.001477	-0.829879	-0.000009	-0.011349	
YY	-0.001029	0.790351	0.000009	-0.067859	
CHDN	0.002965	0.949578	0.000010	0.160364	
MOMO	-0.001461	-3.466952	-0.000039	-0.085503	
IGT	0.000000	-3.197354	-0.000036	-0.239967	
GLUU	-0.001397	1.729728	0.000019	0.303741	
CYOU	0.000000	0.000000	0.000000	NaN	
SOHU	-0.003699	3.991127	0.000043	-0.356095	

CMC	0.001536	2.749496	0.000030	-0.016179
-----	----------	----------	----------	-----------

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

```
[35]:
```

	Returns	Risk	Sharpe Ratio	Max Returns	Min Returns	\
MOMO	-0.001844	0.032884	-0.360181	0.097575	-0.129826	
IGT	0.000121	0.057194	-0.172724	0.343471	-0.334524	
NTDOY	0.001058	0.018443	-0.484861	0.080611	-0.062846	
CZR	0.001935	0.046313	-0.174138	0.426136	-0.309804	
IGGGF	0.000105	0.046357	-0.213455	0.231884	-0.193548	
EA	0.001435	0.021852	-0.391945	0.106649	-0.086441	
CYOU	0.000899	0.033995	-0.267723	0.493243	-0.143426	
ESPO	0.001715	0.017587	-0.471083	0.068273	-0.088411	
TTWO	0.001412	0.024151	-0.355602	0.096555	-0.118522	
YY	0.001216	0.037137	-0.236529	0.159496	-0.158164	
SCPL	0.000520	0.036414	-0.260332	0.205047	-0.164706	
ATVI	0.001977	0.024156	-0.332144	0.091734	-0.106369	
CHDN	0.001872	0.042783	-0.189973	0.210870	-0.220975	
ZNGA	0.001905	0.024281	-0.333407	0.133829	-0.103817	
GLUU	0.000685	0.047045	-0.198003	0.255814	-0.364954	
CMC	0.001184	0.035453	-0.248680	0.121392	-0.173639	
SOHU	-0.001541	0.045675	-0.252671	0.255072	-0.268412	
NEXOF	0.003572	0.047753	-0.134616	0.291875	-0.225931	

	Median Returns	Total Return	Average Return Days	CAGR
MOMO	-0.001461	-3.466952	-0.000039	-0.085503
IGT	0.000000	-3.197354	-0.000036	-0.239967
NTDOY	-0.000035	-0.903612	-0.000010	0.068780
CZR	0.001477	-0.829879	-0.000009	-0.011349
IGGGF	0.000000	-0.623931	-0.000007	-0.012082
EA	0.001675	-0.099327	-0.000001	0.050738
CYOU	0.000000	0.000000	0.000000	NaN
ESPO	0.001570	0.368000	0.000004	NaN
TTWO	0.001277	0.378922	0.000004	0.062633
YY	-0.001029	0.790351	0.000009	-0.067859
SCPL	0.000000	0.825309	0.000009	NaN
ATVI	0.002143	0.833550	0.000009	0.054177
CHDN	0.002965	0.949578	0.000010	0.160364
ZNGA	0.000000	1.371309	0.000015	0.283630
GLUU	-0.001397	1.729728	0.000019	0.303741
CMC	0.001536	2.749496	0.000030	-0.016179
SOHU	-0.003699	3.991127	0.000043	-0.356095
NEXOF	0.000000	7.142856	0.000076	0.204888