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']
```

```
[**********************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
[**********************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
```

```
[**********************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
[**********************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?
2 years
```

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

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

[6]:
```
905
```

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

[7]:

Date	EA	NTDOY	ESPO	IGGGF	SCPL	TTWO	\
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	

Date	ATVI	ZNGA	NEXOF	CZR	YY	CHDN	\
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	

Date	MOMO	IGT	GLUU	CYOU	SOHU	CMC

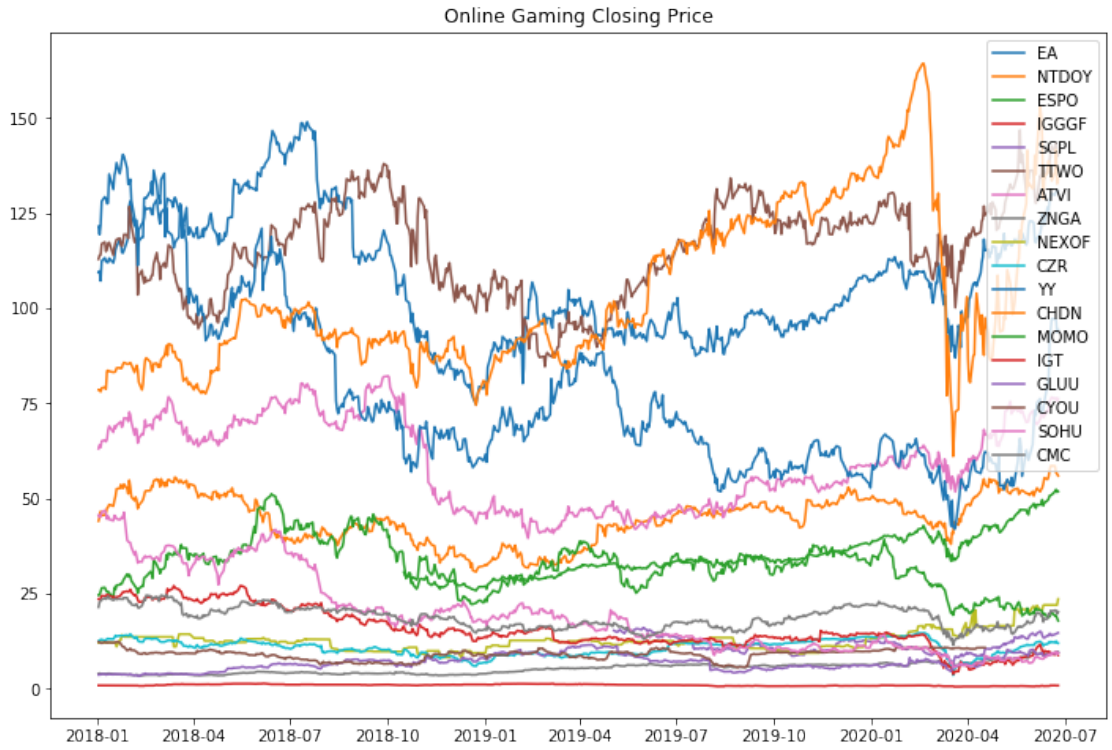
```
Date
2018-01-02  24.564751  23.521132  3.63  12.266425  45.580002  21.397432
2018-01-03  24.602745  23.406864  3.65  12.136746  44.990002  22.835211
2018-01-04  25.524164  23.644188  3.67  12.070243  45.240002  23.004358
2018-01-05  26.436077  24.408888  3.81  11.930589  46.410000  23.399038
2018-01-08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

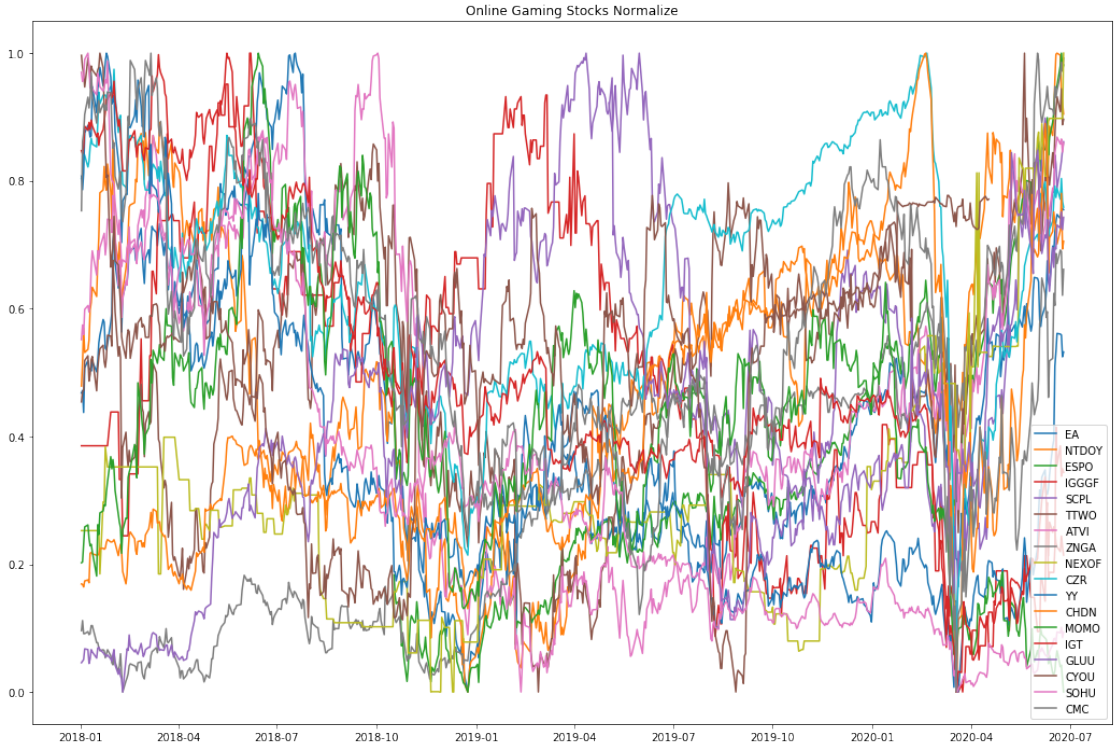
[9]:
```
<matplotlib.legend.Legend at 0x233687c8160>
```



[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)
```

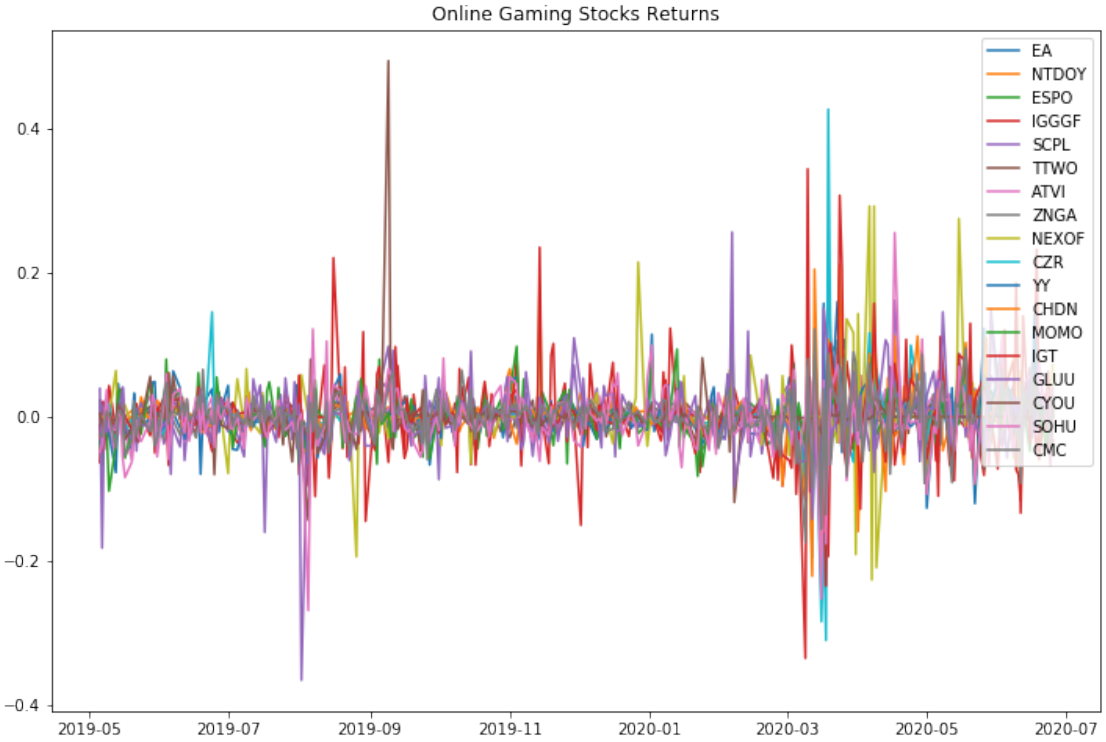
[11]: <matplotlib.legend.Legend at 0x233697cfef0>



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

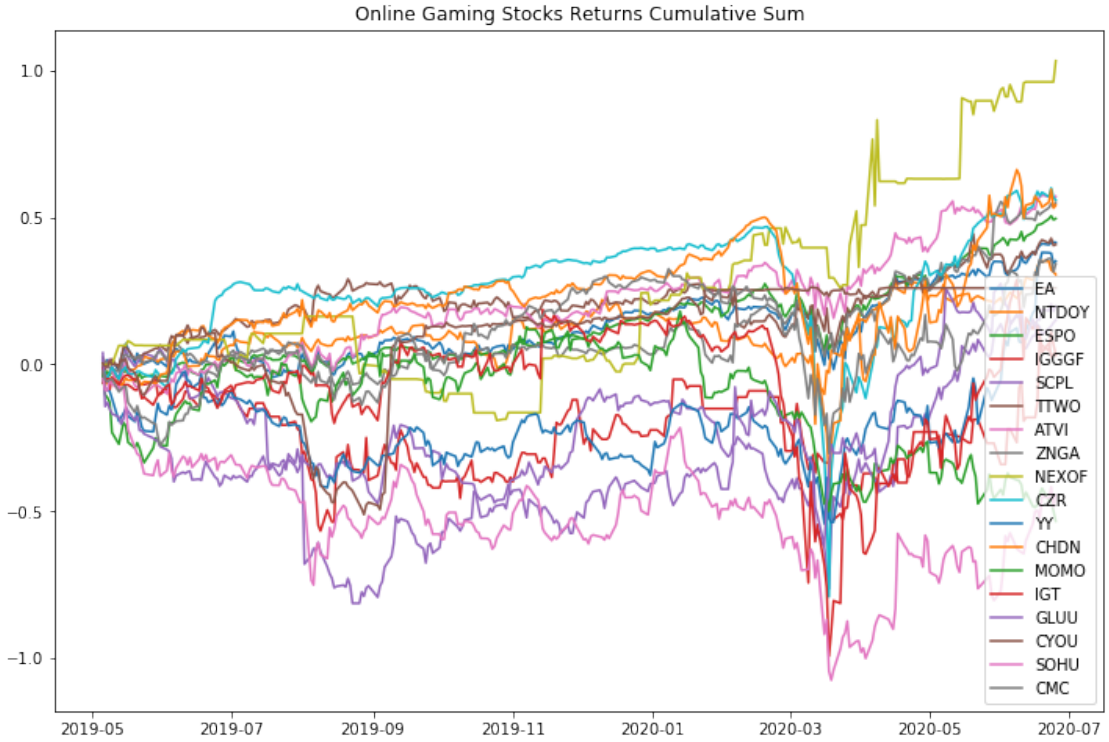
[13]:
```
plt.figure(figsize=(12,8))
plt.plot(stock_rets)
plt.title(title + ' Stocks Returns')
plt.legend(labels=stock_rets.columns)
```

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

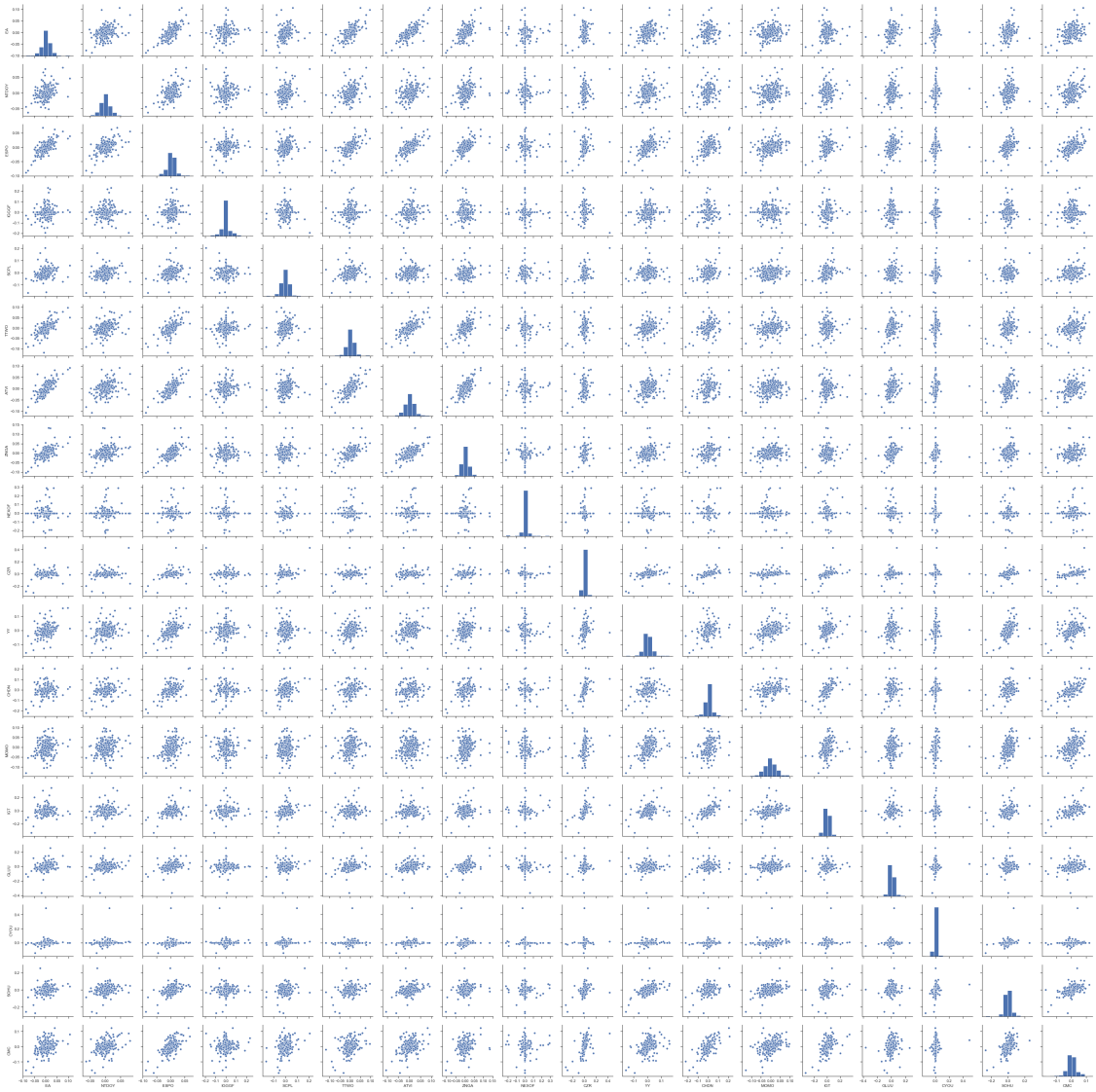


[14]:
```
plt.figure(figsize=(12,8))
plt.plot(stock_rets.cumsum())
plt.title(title + ' Stocks Returns Cumulative Sum')
plt.legend(labels=stock_rets.columns)
```

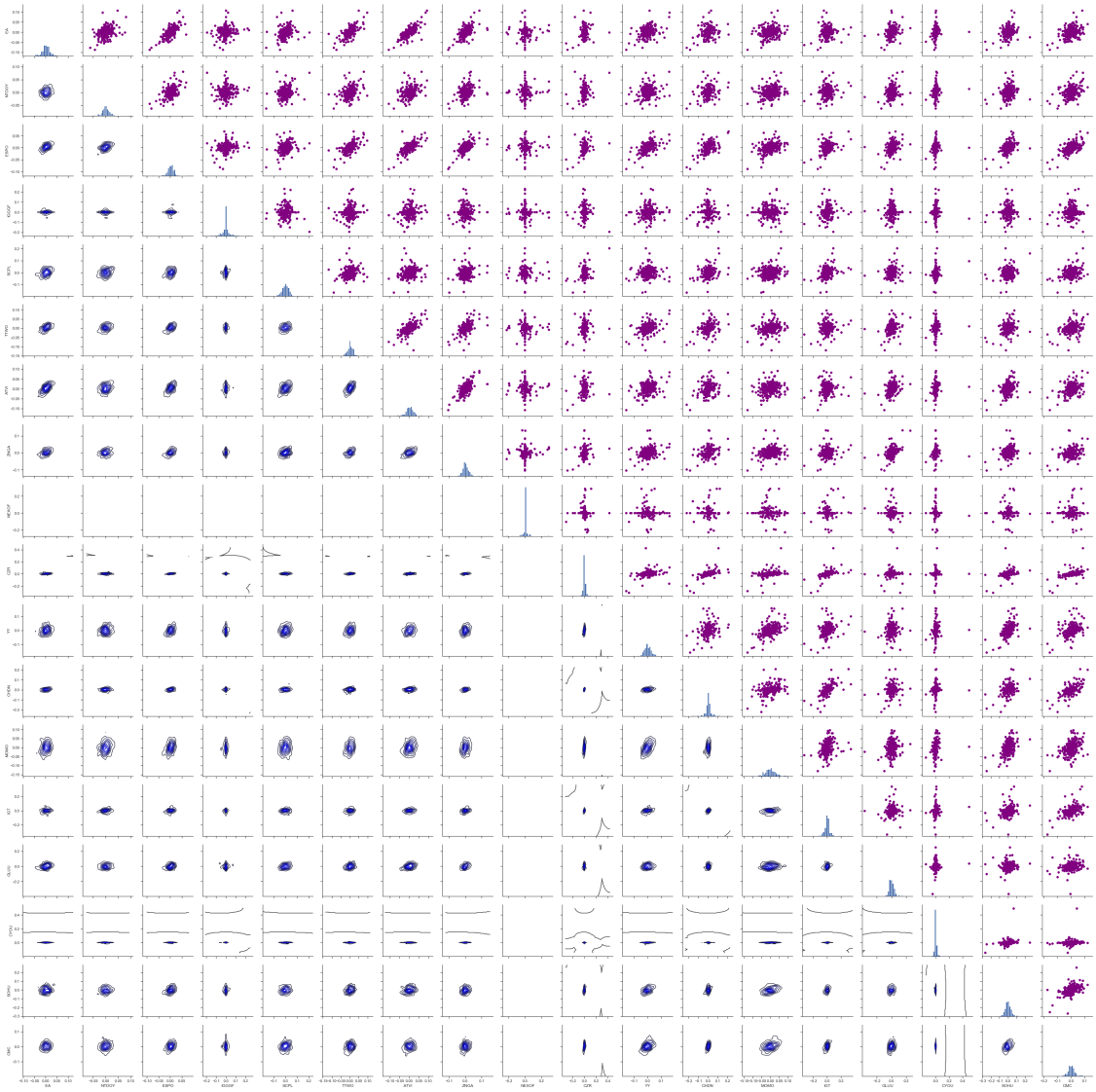
[14]: <matplotlib.legend.Legend at 0x233698e9b00>



[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)
```

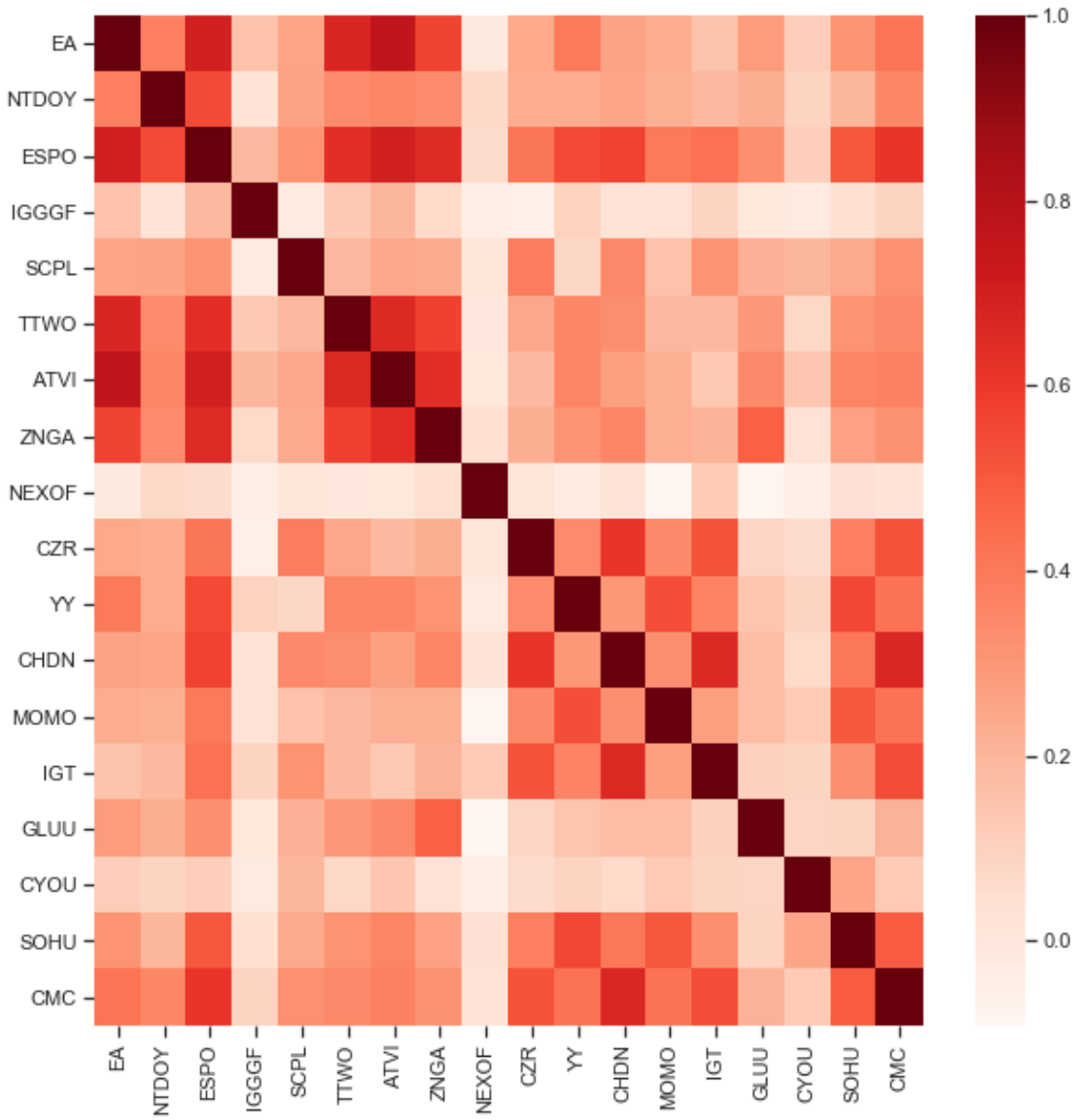


[16]:
```
ax = sns.PairGrid(stock_rets)
ax.map_upper(plt.scatter, color='purple')
ax.map_lower(sns.kdeplot, color='blue')
ax.map_diag(plt.hist, bins=30)
for i in range(nplot) :
    for j in range(nplot) :
        ax.axes[i, j].locator_params(axis='x', nbins=6, tight=True)
```



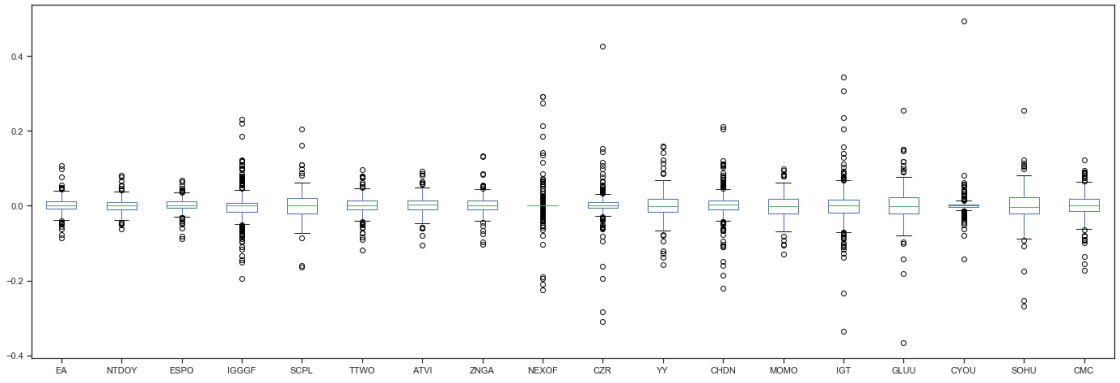
[17]:
```
plt.figure(figsize=(10,10))
corr = stock_rets.corr()

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

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

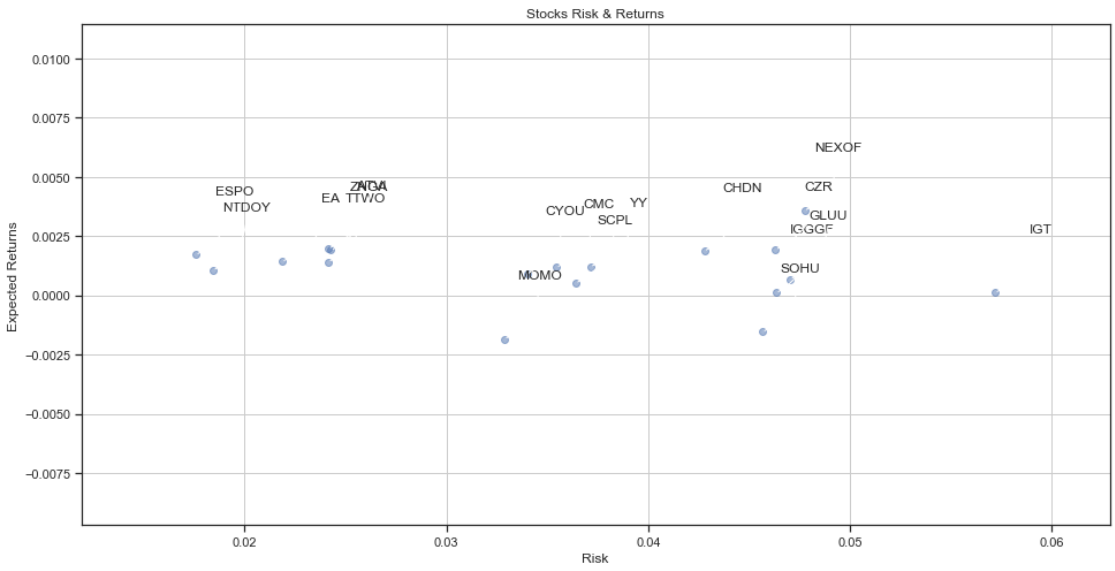


[18]:
```
# Box plot
stock_rets.plot(kind='box',figsize=(24,8))
```

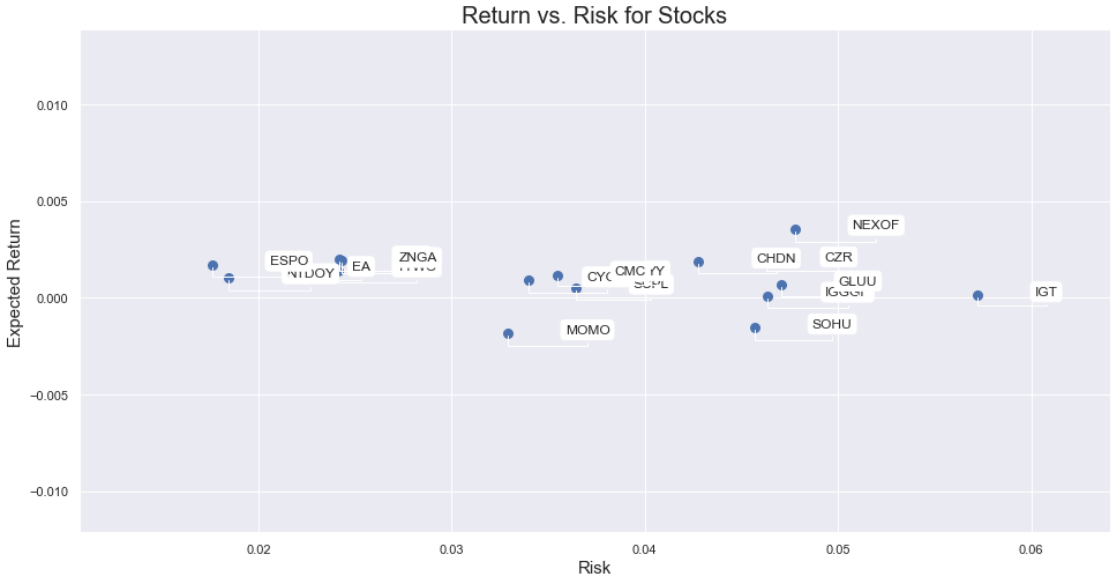
[18]: <matplotlib.axes._subplots.AxesSubplot at 0x23375f7afd0>



[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]:

Date	EA	NTDOY	ESPO	IGGGF	SCPL	TTWO
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

Date	ATVI	ZNGA	NEXOF	CZR	YY	CHDN
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

Date	MOMO	IGT	GLUU	CYOU	SOHU	CMC
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