Big Tech Simple Analysis

December 30, 2024

0.0.1 Simple Analysis

This program will show compute portfolio simple returns, get daily returns and volatility.

[16]:
```
pip install yfinance
```

```
Collecting yfinance
  Downloading yfinance-0.2.51-py2.py3-none-any.whl.metadata (5.5 kB)
Requirement already satisfied: pandas>=1.3.0 in /opt/conda/lib/python3.11/site-
packages (from yfinance) (2.1.3)
Requirement already satisfied: numpy>=1.16.5 in /opt/conda/lib/python3.11/site-
packages (from yfinance) (1.24.4)
Requirement already satisfied: requests>=2.31 in /opt/conda/lib/python3.11/site-
packages (from yfinance) (2.31.0)
Collecting multitasking>=0.0.7 (from yfinance)
  Downloading multitasking-0.0.11-py3-none-any.whl.metadata (5.5 kB)
Requirement already satisfied: lxml>=4.9.1 in /opt/conda/lib/python3.11/site-
packages (from yfinance) (5.2.2)
Requirement already satisfied: platformdirs>=2.0.0 in
/opt/conda/lib/python3.11/site-packages (from yfinance) (4.1.0)
Requirement already satisfied: pytz>=2022.5 in /opt/conda/lib/python3.11/site-
packages (from yfinance) (2023.3.post1)
Collecting frozendict>=2.3.4 (from yfinance)
  Downloading frozendict-2.4.6-py311-none-any.whl.metadata (23 kB)
Collecting peewee>=3.16.2 (from yfinance)
  Downloading peewee-3.17.8.tar.gz (948 kB)
                           948.2/948.2
kB 6.7 MB/s eta 0:00:0000:01
  Installing build dependencies … done
  Getting requirements to build wheel … done
  Preparing metadata (pyproject.toml) … done
Requirement already satisfied: beautifulsoup4>=4.11.1 in
/opt/conda/lib/python3.11/site-packages (from yfinance) (4.12.2)
Requirement already satisfied: html5lib>=1.1 in /opt/conda/lib/python3.11/site-
packages (from yfinance) (1.1)
Requirement already satisfied: soupsieve>1.2 in /opt/conda/lib/python3.11/site-
packages (from beautifulsoup4>=4.11.1->yfinance) (2.5)
Requirement already satisfied: six>=1.9 in /opt/conda/lib/python3.11/site-
```

```
packages (from html5lib>=1.1->yfinance) (1.16.0)
Requirement already satisfied: webencodings in /opt/conda/lib/python3.11/site-
packages (from html5lib>=1.1->yfinance) (0.5.1)
Requirement already satisfied: python-dateutil>=2.8.2 in
/opt/conda/lib/python3.11/site-packages (from pandas>=1.3.0->yfinance) (2.8.2)
Requirement already satisfied: tzdata>=2022.1 in /opt/conda/lib/python3.11/site-
packages (from pandas>=1.3.0->yfinance) (2023.3)
Requirement already satisfied: charset-normalizer<4,>=2 in
/opt/conda/lib/python3.11/site-packages (from requests>=2.31->yfinance) (3.3.2)
Requirement already satisfied: idna<4,>=2.5 in /opt/conda/lib/python3.11/site-
packages (from requests>=2.31->yfinance) (3.6)
Requirement already satisfied: urllib3<3,>=1.21.1 in
/opt/conda/lib/python3.11/site-packages (from requests>=2.31->yfinance) (2.1.0)
Requirement already satisfied: certifi>=2017.4.17 in
/opt/conda/lib/python3.11/site-packages (from requests>=2.31->yfinance)
(2023.11.17)
Downloading yfinance-0.2.51-py2.py3-none-any.whl (104 kB)
                         104.7/104.7 kB
841.3 kB/s eta 0:00:0000:01
Downloading frozendict-2.4.6-py311-none-any.whl (16 kB)
Downloading multitasking-0.0.11-py3-none-any.whl (8.5 kB)
Building wheels for collected packages: peewee
  Building wheel for peewee (pyproject.toml) … done
  Created wheel for peewee:
filename=peewee-3.17.8-cp311-cp311-linux_x86_64.whl size=300748
sha256=8957e006a00558a9f01b53d3efe7f944c998c8852b37acb790fe4ed7e59fe3ce
  Stored in directory: /home/jovyan/.cache/pip/wheels/ff/6c/15/506e25bc390de450a
7fa53c155cd9b0fbd13ad3e84a9abc183
Successfully built peewee
Installing collected packages: peewee, multitasking, frozendict, yfinance
Successfully installed frozendict-2.4.6 multitasking-0.0.11 peewee-3.17.8
yfinance-0.2.51
Note: you may need to restart the kernel to use updated packages.
```

[17]:
```
#import

import numpy as np
import pandas as pd
import yfinance as yf
import matplotlib.pyplot as plt
from datetime import datetime

plt. style.use('fivethirtyeight')
```

[6]:
```
#Stock symbols
stockSymbols  = ["GOOGL", "AAPL", "AMZN", "META", "MSFT", "NVDA", "TSLA"]
```

[8]:
```
#start date
stockStartDate = '2022-01-01'
```

[9]:
```
#todays date YYYY-mm-dd
today = datetime.today().strftime('%Y-%m-%d')
print(today)
```

```
2024-12-30
```

[12]:
```
#Get the number of assets

numAssets = len(stockSymbols)

#print(f'You have {numAssets} assets in your portfolio.')
```

[73]:
```
#Get stock prices
def getStockPrices(stocks = stockSymbols, start = stockStartDate, end = today,␣
 ↪col = 'Close'):
    data = yf.download(stocks, start=start, end=end)[col]
    return data

stocks_prices = getStockPrices(stockSymbols)

#stocks_prices
```

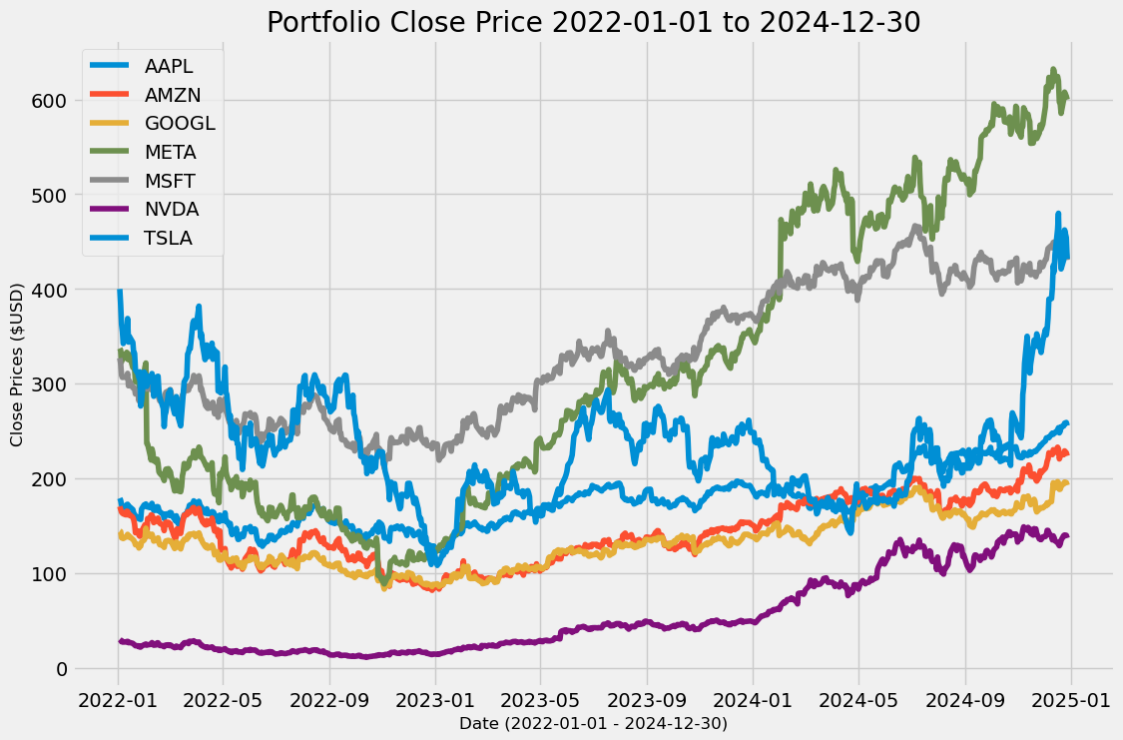
```
[**********************100%**********************]  7 of 7 completed
```

[32]:
```
def graph(stocks = stockSymbols, start = stockStartDate, end = today, col =␣
 ↪'Close'):
    #title
    title = f'Portfolio {col} Price {start} to {end}'

    #get the stocks
    stocks_prices = getStockPrices(stocks= stocks, start = start, end = end,␣
 ↪col = col)

    #figure size
    plt.figure(figsize = (12, 8))

    #Plot iteration
    for i in stocks_prices.columns.values:
        plt.plot(stocks_prices[i], label=i)

    plt.title(title)
    plt.xlabel(f'Date ({start} - {end})', fontsize = 12)
    plt.ylabel(f'{col} Prices ($USD)', fontsize = 12)
```

```
    plt.legend(stocks_prices.columns.values, loc = 'upper left')
    plt.show()
```

[33]:
```
graph(stockSymbols)
```

```
[**********100%**********]  7 of 7 completed
```



[74]:
```
# 2 years returns for Big Tech
daily_returns = stocks_prices.pct_change(1) #fractional changes between current␣
 ↪and prior element

#daily_returns
```

[36]:
```
daily_returns.corr()
```

[36]:

Ticker	AAPL	AMZN	GOOGL	META	MSFT	NVDA	TSLA
Ticker							
AAPL	1.000000	0.563115	0.622199	0.502307	0.684440	0.554810	0.498880
AMZN	0.563115	1.000000	0.649585	0.598642	0.689201	0.556612	0.448672
GOOGL	0.622199	0.649585	1.000000	0.597194	0.694386	0.548561	0.402920
META	0.502307	0.598642	0.597194	1.000000	0.593425	0.502581	0.316783
MSFT	0.684440	0.689201	0.694386	0.593425	1.000000	0.638074	0.418782

```
NVDA    0.554810  0.556612  0.548561  0.502581  0.638074  1.000000  0.458779
TSLA    0.498880  0.448672  0.402920  0.316783  0.418782  0.458779  1.000000
```

[40]:
```
daily_returns.cov()
#daily_returns.var()
```

[40]:
```
Ticker      AAPL      AMZN     GOOGL      META      MSFT      NVDA      TSLA
Ticker
AAPL    0.000292  0.000233  0.000219  0.000264  0.000203  0.000330  0.000329
AMZN    0.000233  0.000584  0.000324  0.000445  0.000290  0.000469  0.000419
GOOGL   0.000219  0.000324  0.000426  0.000379  0.000249  0.000395  0.000321
META    0.000264  0.000445  0.000379  0.000944  0.000317  0.000538  0.000376
MSFT    0.000203  0.000290  0.000249  0.000317  0.000302  0.000387  0.000281
NVDA    0.000330  0.000469  0.000395  0.000538  0.000387  0.001215  0.000618
TSLA    0.000329  0.000419  0.000321  0.000376  0.000281  0.000618  0.001492
```

0.0.2 Results from covariance matrix

Diagonals shows the variance of each stocks symbols and higher the variance the higher risk, higher returns and higher volatility. In constrast, lower variance, lower risk and returns.

Non-diagonals shows covariance between two different stock symbols. If it's positive covariance, it shows that the two assets tend to move in the same direction. Since we are investigating the Big Tech companies, they obviously have some covariance between them.

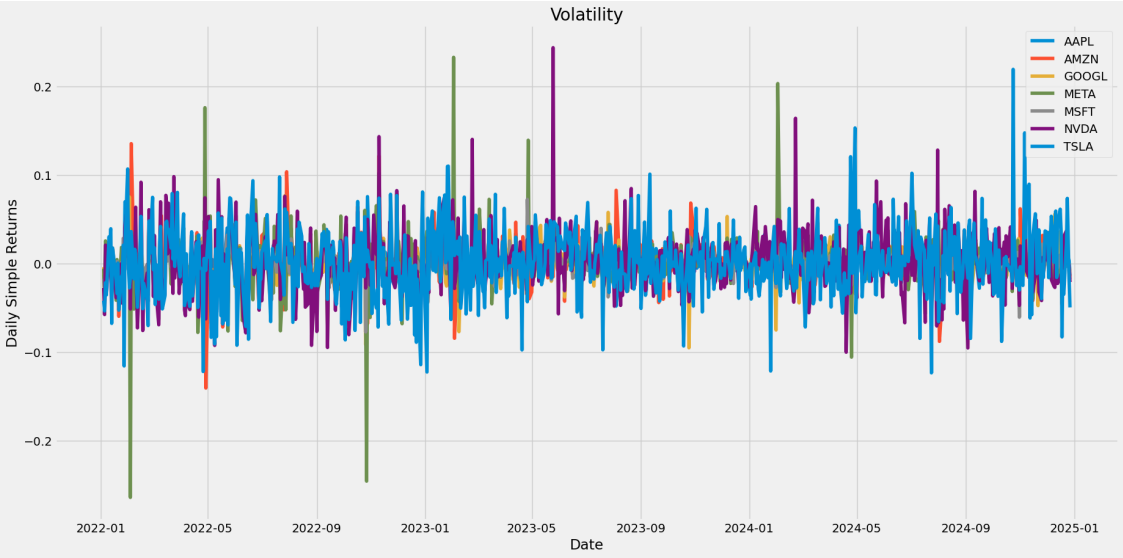
0.0.3 Volatility

[49]:
```
daily_returns.std()
```

[49]:
```
Ticker
AAPL     0.017080
AMZN     0.024173
GOOGL    0.020648
META     0.030725
MSFT     0.017386
NVDA     0.034851
TSLA     0.038630
dtype: float64
```

[53]:
```
plt.figure(figsize = (20,10))

for i in daily_returns.columns.values:
    plt.plot(daily_returns[i], label = i)

plt.legend(loc='upper right')
plt.title('Volatility')
plt.xlabel('Date')
plt.ylabel('Daily Simple Returns')
```

```
plt.show()
```



[77]:
```
dailyMean = daily_returns.mean()
#dailyMean
```

[61]:
```
#expected daily return

#5% AAPL, 5% AMZN, 5% GOOGL, 20% META, 15% MSFT, 25% NVDA, 25% TSLA
randomWeights = np.array([0.05, 0.05, 0.05, 0.2, 0.15, 0.25, 0.25])

portfolioReturn = np.sum(dailyMean * randomWeights)

print(f"The daily expected portfolio return: {portfolioReturn}")
```

```
The daily expected portfolio return: 0.001287295662819741
```

[64]:
```
#yearly return

print(f"Expected annualised portfolio return: {portfolioReturn * 251}")
```

```
Expected annualised portfolio return: 0.323111211367755
```

About 32.3% return with the weights of

5% AAPL, 5% AMZN, 5% GOOGL, 20% META, 15% MSFT, 25% NVDA, 25% TSLA

[75]:
```
#Growth of the investment

growthReturns = (daily_returns+1).cumprod() #Return cumulative product
```

```
#growthReturns
```

[72]:
```
#Visualize daily cumulative returns

plt.figure(figsize = (15,7))

for i in growthReturns.columns.values:
    plt.plot(growthReturns.index, growthReturns[i], label = i)

plt.legend(loc = 'upper left')
plt.xlabel(f'Date {stockStartDate} - {today}')
plt.ylabel(f'Growth of $1 investment')
plt.title("Daily Cumulative Simple Returns")
plt.show()
```