initial_eda

April 13, 2025

[28]:

```
!pip install python-dotenv -q
!pip install yfinance -q
```

```
WARNING: Skipping /Users/I523193/miniforge3/envs/tf/lib/python3.12/site-
packages/typer-0.9.4.dist-info due to invalid metadata entry 'name'
WARNING: Skipping
/Users/I523193/miniforge3/envs/tf/lib/python3.12/site-packages/typer-0.9.4.dist-
info due to invalid metadata entry 'name'
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WARNING: Skipping
/Users/I523193/miniforge3/envs/tf/lib/python3.12/site-packages/typer-0.9.4.dist-
info due to invalid metadata entry 'name'
```

[7]:

```
import os
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
from datetime import datetime, timedelta
from alpaca.data.historical import StockHistoricalDataClient
from alpaca.data.requests import StockBarsRequest
from alpaca.data.timeframe import TimeFrame
import logging
from dotenv import load_dotenv
```

[8]:

```
load_dotenv()
```

[8]: True

[9]:

```
api_key = os.getenv('ALPACA_API_KEY')
api_secret = os.getenv('ALPACA_API_SECRET')
data_client = StockHistoricalDataClient(api_key, api_secret)
```

[10]:

```
logging.basicConfig(level=logging.INFO)
logger = logging.getLogger(__name__)
```

[11]:

```
symbols = ['AAPL']
timeframe = TimeFrame.Day
days = 10  # Past year
```

[12]:

```
def get_historical_data(symbol, days=1):
    """Fetch historical stock data."""
    end = datetime.now()
    start = end - timedelta(days=days)

    request_params = StockBarsRequest(
        symbol_or_symbols=symbol,
        timeframe=timeframe,
        start=start,
        end=end
    )

    bars = data_client.get_stock_bars(request_params)
    df = bars.df
    if df.empty:
        logger.warning(f"No data found for {symbol}")
        return None

    # Reset index to make timestamp a column and sort
    df = df.reset_index()
    df = df.sort_values(by=["timestamp"])

    logger.info(f"Retrieved {len(df)} bars for {symbol}")
    return df
```

[13]:

```
dataframes = {}
for symbol in symbols:
    df = get_historical_data(symbol, days)
    if df is not None:
        dataframes[symbol] = df
```

```
INFO:__main__:Retrieved 6 bars for AAPL
```

[14]:

```
combined_df = pd.concat(dataframes, keys=symbols, names=['Symbol', 'Index'])
```

[15]:

```
combined_df.head(20)
```

[15]:

```
              symbol                  timestamp     open      high     low  \
Symbol Index
AAPL   0        AAPL 2025-03-10 04:00:00+00:00  235.540  236.1600  224.22
       1        AAPL 2025-03-11 04:00:00+00:00  223.805  225.8399  217.45
       2        AAPL 2025-03-12 04:00:00+00:00  220.140  221.7500  214.91
       3        AAPL 2025-03-13 04:00:00+00:00  215.950  216.8394  208.42
       4        AAPL 2025-03-14 04:00:00+00:00  211.250  213.9500  209.58
       5        AAPL 2025-03-17 04:00:00+00:00  213.310  214.9700  209.97

               close      volume  trade_count        vwap
Symbol Index
AAPL   0      227.48  72071197.0    1152721.0  227.623563
       1      220.84  76137410.0     899698.0  221.096091
       2      216.98  62547467.0     792931.0  217.596761
       3      209.68  61368330.0     768934.0  212.024245
       4      213.49  60107582.0     668917.0  212.466779
       5      211.30  21601713.0     358577.0  212.300671
```

[2]:

```
import yfinance as yf
```

[16]:

```
df = yf.download("AAPL", period="10d", interval="1d")
```

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

[18]:

```
df.head(20)
```

[18]:

```
Price            Close        High         Low        Open    Volume
Ticker            AAPL        AAPL        AAPL        AAPL      AAPL
Date
2025-03-04  235.929993  240.070007  234.679993  237.710007  53798100
2025-03-05  235.740005  236.550003  229.229996  235.419998  47227600
2025-03-06  235.330002  237.860001  233.160004  234.440002  45170400
2025-03-07  239.070007  241.369995  234.759995  235.110001  46273600
2025-03-10  227.479996  236.160004  224.220001  235.539993  72071200
2025-03-11  220.839996  225.839996  217.449997  223.809998  76137400
2025-03-12  216.979996  221.750000  214.910004  220.139999  62547500
2025-03-13  209.679993  216.839996  208.419998  215.949997  61368300
2025-03-14  213.490005  213.949997  209.580002  211.250000  60060200
2025-03-17  211.324997  214.970001  209.979996  213.360001  21635342
```

[71]:

```
combined_df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
MultiIndex: 12 entries, ('AAPL', 0) to ('NVDA', 1)
Data columns (total 9 columns):
 #   Column       Non-Null Count  Dtype
---  ------       --------------  -----
 0   symbol       12 non-null     object
 1   timestamp    12 non-null     datetime64[ns, UTC]
 2   open         12 non-null     float64
 3   high         12 non-null     float64
 4   low          12 non-null     float64
 5   close        12 non-null     float64
 6   volume       12 non-null     float64
 7   trade_count  12 non-null     float64
 8   vwap         12 non-null     float64
dtypes: datetime64[ns, UTC](1), float64(7), object(1)
memory usage: 1.3+ KB
```

[25]:

```
combined_df.describe()
```

[25]:

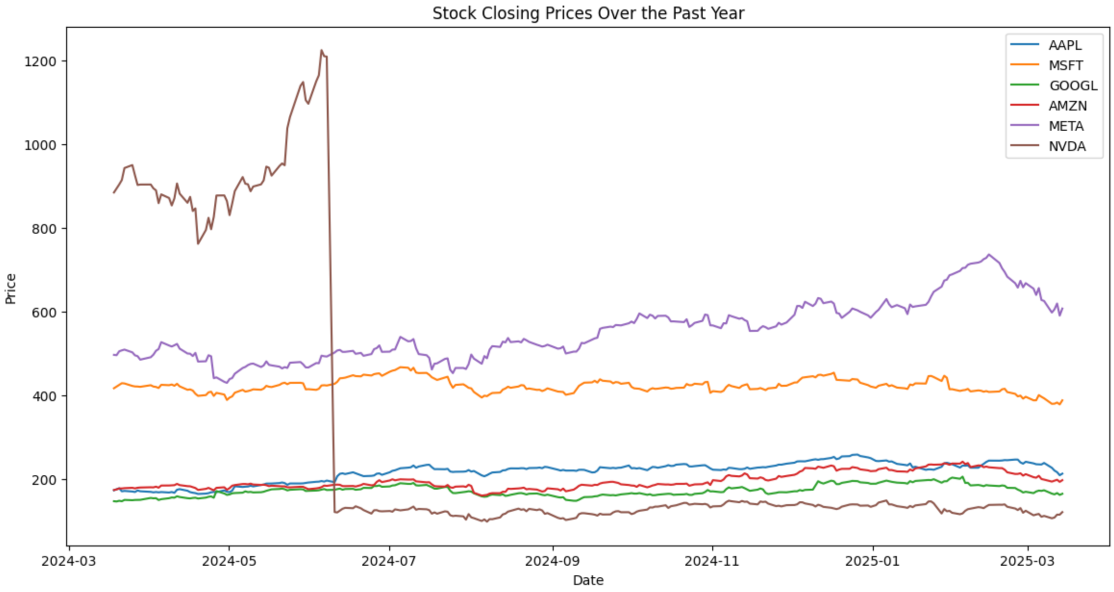
```
              open         high          low        close        volume  \
count  1494.000000  1494.000000  1494.000000  1494.000000  1.494000e+03
mean    313.064088   316.788923   308.970618   313.015663  6.413230e+07
std     198.982897   201.881482   195.584409   199.051273  9.396769e+07
min      92.060000   103.410000    90.690000    98.910000  4.726056e+06
25%     173.915000   175.992500   171.980000   173.580000  1.861931e+07
50%     221.655000   223.995000   219.540000   221.620000  3.075522e+07
75%     429.837500   432.992500   426.250000   430.267500  5.016307e+07
max    1240.480000  1255.870000  1183.200000  1224.400000  8.188309e+08

        trade_count         vwap
count  1.494000e+03  1494.000000
mean   6.526662e+05   312.976173
std    6.495850e+05   198.901782
min    1.212250e+05    99.346923
25%    3.161215e+05   173.699497
50%    4.119060e+05   221.735927
75%    6.689130e+05   429.805331
max    7.844400e+06  1209.840187
```

0.1 Charts

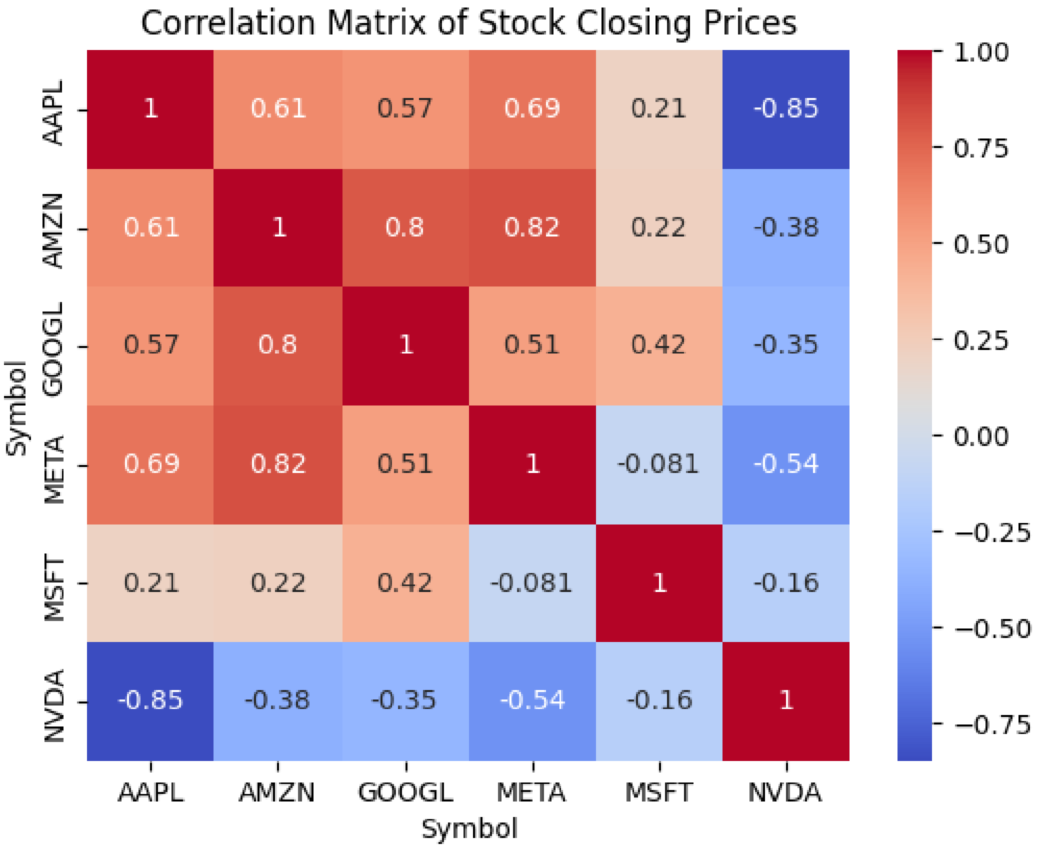
[26]:

```
plt.figure(figsize=(14, 7))
for symbol in symbols:
    plt.plot(combined_df.loc[symbol]['timestamp'], combined_df.
 ↪loc[symbol]['close'], label=symbol)
plt.title('Stock Closing Prices Over the Past Year')
plt.xlabel('Date')
plt.ylabel('Price')
plt.legend()
plt.show()
```



[27]:

```
correlation_matrix = combined_df.pivot_table(index='timestamp',␣
 ↪columns='Symbol', values='close').corr()
sns.heatmap(correlation_matrix, annot=True, cmap='coolwarm')
plt.title('Correlation Matrix of Stock Closing Prices')
plt.show()
```


Correlation Matrix of Stock Closing Prices
AAPL
AMZN
GOOGL
META
MSFT
NVDA
Symbol
1 0.61 0.57 0.69 0.21 -0.85
0.61 1 0.8 0.82 0.22 -0.38
0.57 0.8 1 0.51 0.42 -0.35
0.69 0.82 0.51 1 -0.081 -0.54
0.21 0.22 0.42 -0.081 1 -0.16
-0.85 -0.38 -0.35 -0.54 -0.16 1
AAPL
AMZN
GOOGL
META
MSFT
NVDA
Symbol
1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75

[ ]: