```
import pandas as pd
repo = "https://raw.githubusercontent.com/rcamwm/DATA301-project-data/main/"
```

Summary

Observational units are days of the calendar year. Each unit includes a year, a month, and a day, formatted as `YYYY-MM-DD`.

Variables are:

- Change in value of the NASDAQ
- Maximum difference in value of the NASDAQ
- Closing Price of NASDAQ
- Change in value of the SP500
- Maximum difference in value of the SP500
- Closing Price of SP500
- Change in value of Ethereum
- Maximum difference in value of Ethereum
- Closing Price of Ethereum

Change in value variables are measured by subtracting the day's opening value from its closing value, while maximum difference variables are measured by subtracting the day's lowest value from its highest value.

Opening, closing, lowest, and highest values are all publicly available from stock exchanges.

Data Cleaning

Ethereum Dataset

Description

The data shows the change in Ethereum's price from 2017 to roughly the present.

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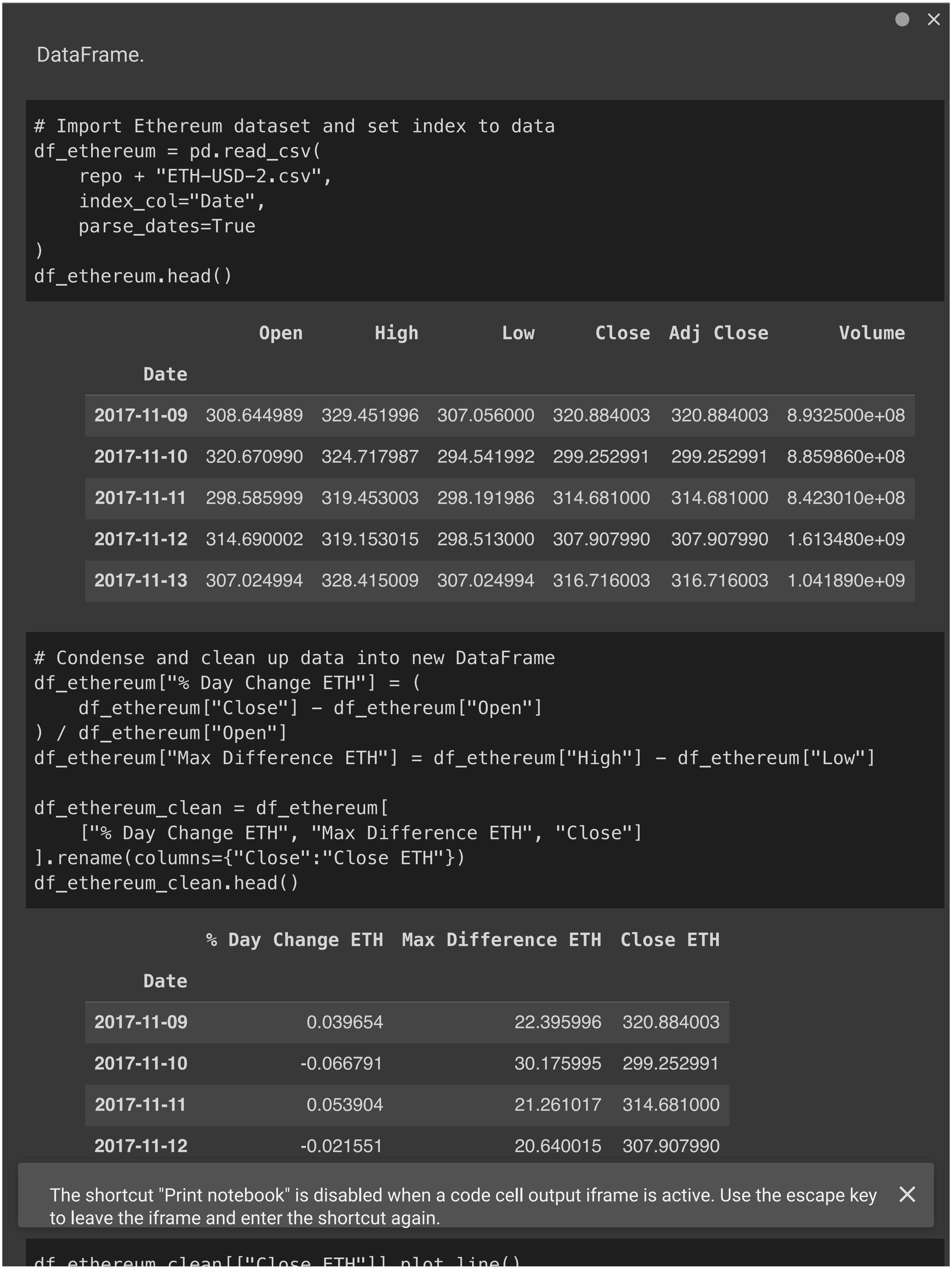
Set the index to the `Date` column, and created new columns for each day's change in value as



DataFrame.

```
# Import Ethereum dataset and set index to data
df_ethereum = pd.read_csv(
    repo + "ETH-USD-2.csv",
    index_col="Date",
    parse_dates=True
)
df_ethereum.head()
```

```
                  Open        High         Low       Close   Adj Close        Volume
      Date
2017-11-09  308.644989  329.451996  307.056000  320.884003  320.884003  8.932500e+08
2017-11-10  320.670990  324.717987  294.541992  299.252991  299.252991  8.859860e+08
2017-11-11  298.585999  319.453003  298.191986  314.681000  314.681000  8.423010e+08
2017-11-12  314.690002  319.153015  298.513000  307.907990  307.907990  1.613480e+09
2017-11-13  307.024994  328.415009  307.024994  316.716003  316.716003  1.041890e+09
```

```
# Condense and clean up data into new DataFrame
df_ethereum["% Day Change ETH"] = (
    df_ethereum["Close"] - df_ethereum["Open"]
) / df_ethereum["Open"]
df_ethereum["Max Difference ETH"] = df_ethereum["High"] - df_ethereum["Low"]

df_ethereum_clean = df_ethereum[
    ["% Day Change ETH", "Max Difference ETH", "Close"]
].rename(columns={"Close":"Close ETH"})
df_ethereum_clean.head()
```

```
            % Day Change ETH  Max Difference ETH   Close ETH
      Date
2017-11-09          0.039654           22.395996  320.884003
2017-11-10         -0.066791           30.175995  299.252991
2017-11-11          0.053904           21.261017  314.681000
2017-11-12         -0.021551           20.640015  307.907990
```

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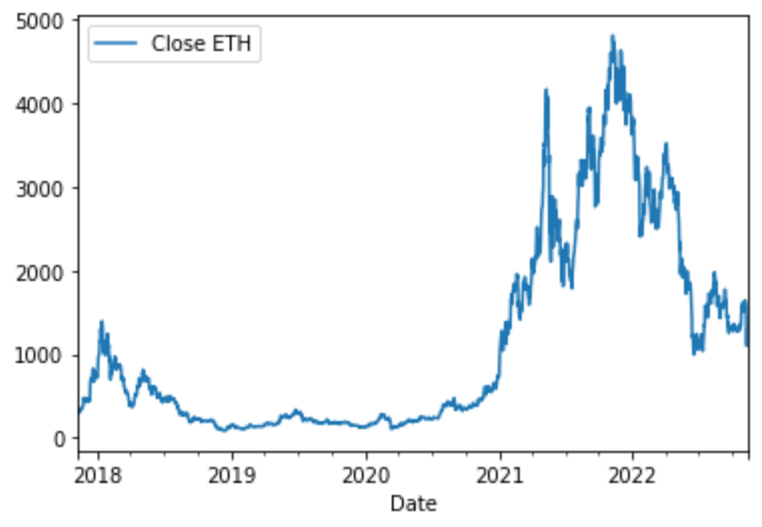
```
df_ethereum_clean[["Close ETH"]].plot.line()
```

```
df_ethereum_clean[["Close ETH"]].plot.line()
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x7f5c6c743850>
```



NASDAQ Dataset

Description

The data shows the change in the NASDAQ's price from 2017 to roughly the present.

Cleaning Process

Set the index to the `Date` column after running it through a function to reformat it. Also created new columns for each day's change in value as well as the maximum difference in value. These new columns were then moved to a new DataFrame.

```
# Import NASDAQ dataset and set index to data
df_nasdaq = pd.read_csv(repo + "NASDAQ.csv",
    index_col="Date",
    parse_dates=True
)
```

```
# Condense data into new DataFrame
df_nasdaq["Close NASDAQ"] = df_nasdaq["Close/Last"]
df_nasdaq["% Day Change NASDAQ"] = (
    df_nasdaq["Close/Last"] - df_nasdaq["Open"]
) / df_nasdaq["Open"]
```

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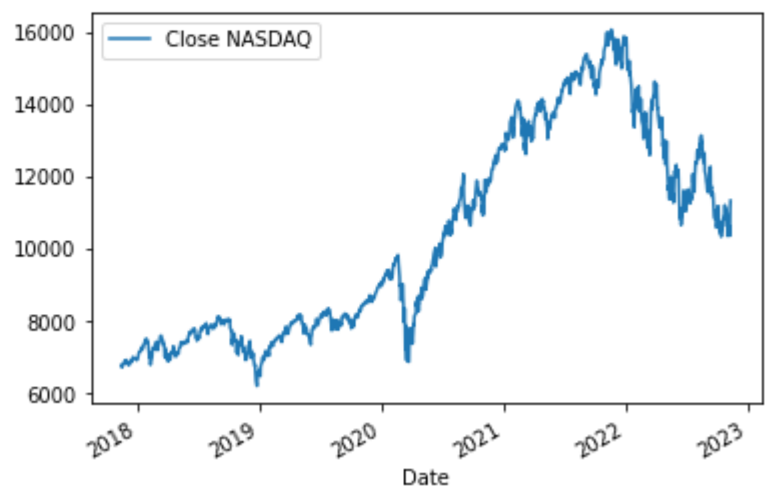
```
df_nasdaq_clean = df_nasdaq.loc[
    ~((df_nasdaq["High"] == 0) & (df_nasdaq["Low"] == 0)) # filter out entries with
][["Close NASDAQ", "% Day Change NASDAQ", "Max Difference NASDAQ"]]

df_nasdaq_clean.head()
```

	Close NASDAQ	% Day Change NASDAQ	Max Difference NASDAQ
Date			
2022-11-11	11323.33	0.017850	282.60
2022-11-10	11114.15	0.022539	339.16
2022-11-09	10353.17	-0.016946	220.96
2022-11-08	10616.20	0.000440	272.91
2022-11-07	10564.52	0.004524	159.05

```
df_nasdaq_clean[["Close NASDAQ"]].plot.line()
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x7f5c6c7aaac0>
```



S&P 500 Dataset

Description

The data shows the change in the S&P 500's price from 2017 to roughly the present.

Cleaning Process

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with no data usable data were filtered out, and the new columns were moved to a new

DataFrame.

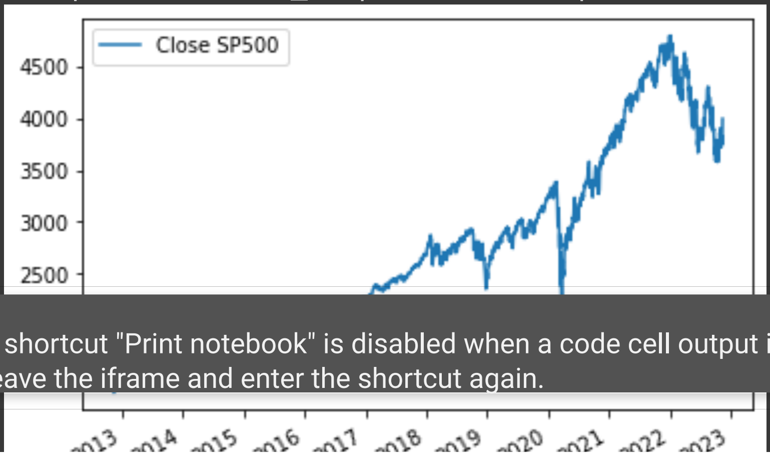
```
# Import SP500 dataset and set index to data
df_sp500 = pd.read_csv(repo + "SP500.csv",
    index_col="Date",
    parse_dates=True
)
```

```
# Condense and clean up data into new DataFrame
df_sp500["Close SP500"] = df_sp500["Close/Last"]
df_sp500["% Day Change SP500"] = (
    df_sp500["Close/Last"] - df_sp500["Open"]
) / df_sp500["Open"]
df_sp500["Max Difference SP500"] = df_sp500["High"] - df_sp500["Low"]

df_sp500_clean = df_sp500.loc[
    ~((df_sp500["High"] == 0) & (df_sp500["Low"] == 0)) # filter out entries with r
][["Close SP500", "% Day Change SP500", "Max Difference SP500"]]

df_sp500_clean.head()
```

	Close SP500	% Day Change SP500	Max Difference SP500
Date			
2022-11-11	3992.93	0.007369	56.66
2022-11-10	3956.37	0.024996	98.44
2022-11-09	3748.57	-0.016366	73.98
2022-11-08	3828.11	0.002905	73.12
2022-11-07	3806.80	0.006901	49.25

```
df_sp500_clean[["Close SP500"]].plot.line()
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x7f5c6c035760>
```



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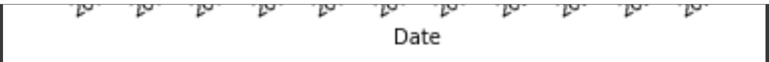

Combined Dataset (ETH, SP500, NASDAQ)

Description

The data shows the change in the ETH, SP500, NASDAQ over time combined.

```
df_stocks_crypto = df_nasdaq_clean.join(
    df_sp500_clean
).join(
    df_ethereum_clean
).dropna()

df_stocks_crypto
```

	Close NASDAQ	% Day Change NASDAQ	Max Difference NASDAQ	Close SP500	% Day Change SP500	Max Difference SP500	% Day Change ETH
Date							
2022-11-11	11323.33	0.017850	282.60	3992.93	0.007369	56.66	-0.008978
2022-11-10	11114.15	0.022539	339.16	3956.37	0.024996	98.44	0.181216
2022-11-09	10353.17	-0.016946	220.96	3748.57	-0.016366	73.98	-0.174742
2022-11-08	10616.20	0.000440	272.91	3828.11	0.002905	73.12	-0.150156
2022-11-07	10564.52	0.004524	159.05	3806.80	0.006901	49.25	-0.002179
...	...	...	...	...	...	...	...
2017-11-17	6782.79	-0.001716	20.32	2578.85	-0.001583	6.34	0.006745
2017-11-16	6793.29	0.007558	64.34	2585.64	0.004932	17.14	-0.007554
2017-11-15	6706.21	0.000825	58.01	2564.62	-0.001880	15.39	-0.013632
2017-11-14	6737.87	0.000594	34.36	2578.87	0.000434	13.10	0.065879
2017-11-13	6757.60	0.004491	42.87	2584.84	0.003225	13.18	0.031564

ETH NASDAQ AND SP500 Correlation

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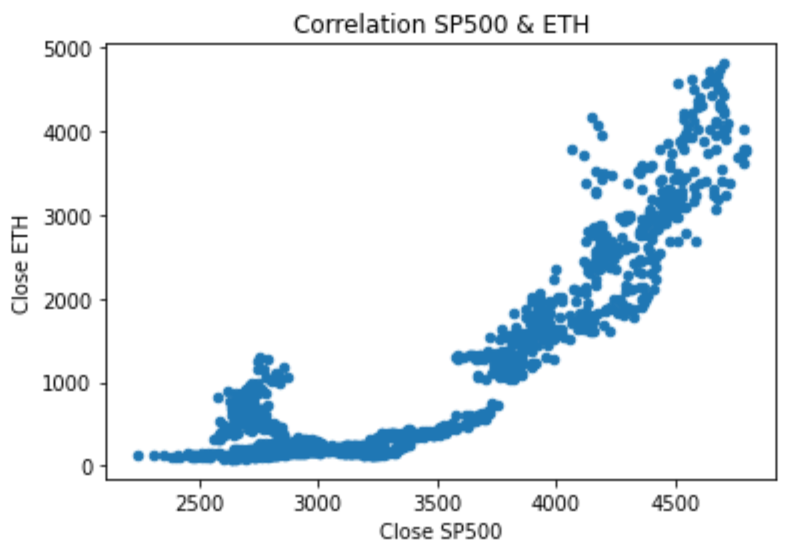
Description

This visual shows how ETH, SP500, and NASDAQ are correlated over time.

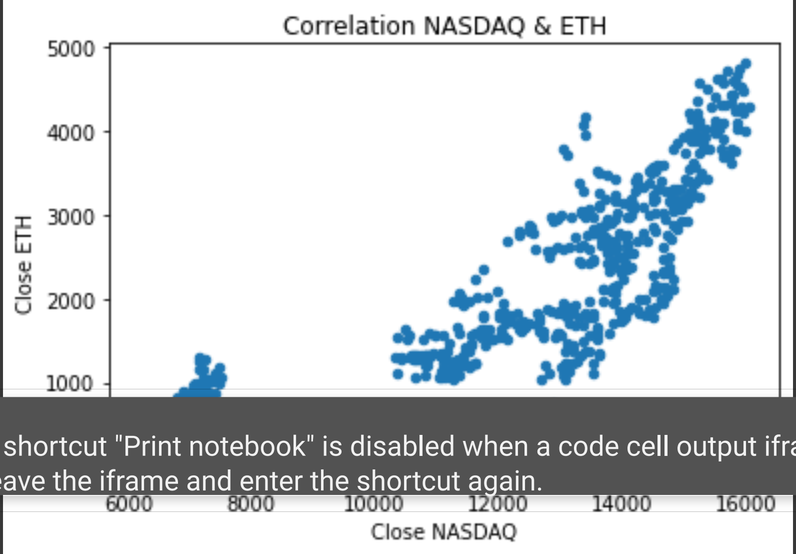
```
df_stocks_crypto.plot(
    kind="scatter",
    x="Close SP500",
    y="Close ETH",
    title = "Correlation SP500 & ETH"
)
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x7f5c6bd7e490>
```



```
df_stocks_crypto.plot(
    kind="scatter",
    x="Close NASDAQ",
    y="Close ETH",
    title = "Correlation NASDAQ & ETH"
)
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x7f5c6bce2c10>
```



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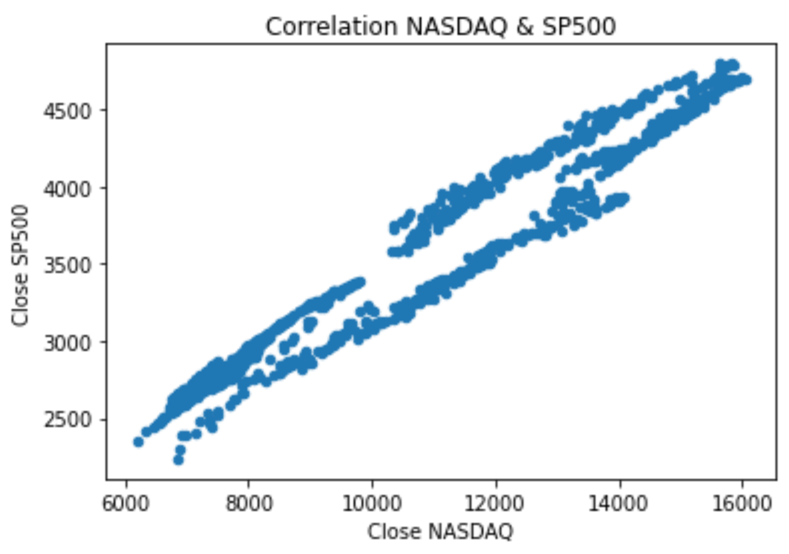
```
df_stocks_crypto.plot(
    kind="scatter",
    x="Close NASDAQ",
    y="Close SP500",
    title = "Correlation NASDAQ & SP500"
)
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x7f5c6bd884c0>
```



GDP Dataset

Description

The data shows the change in GDP from 1980 to 2022, plus projections for 2023-2027. Data has been filtered out to only show the world's top 5 GDP's for display purposes.

```
# Import GDP dataset and condense into new DataFrame
df_gdp = pd.read_csv(repo + "GDP-Changes.csv")
df_gdp_clean = df_gdp.rename(
    columns = {"Real GDP growth (Annual percent change)":"Year"}
)[[
    "Year",
    "United States",
    "China, People's Republic of",
    "Japan",
    "Germany",
```

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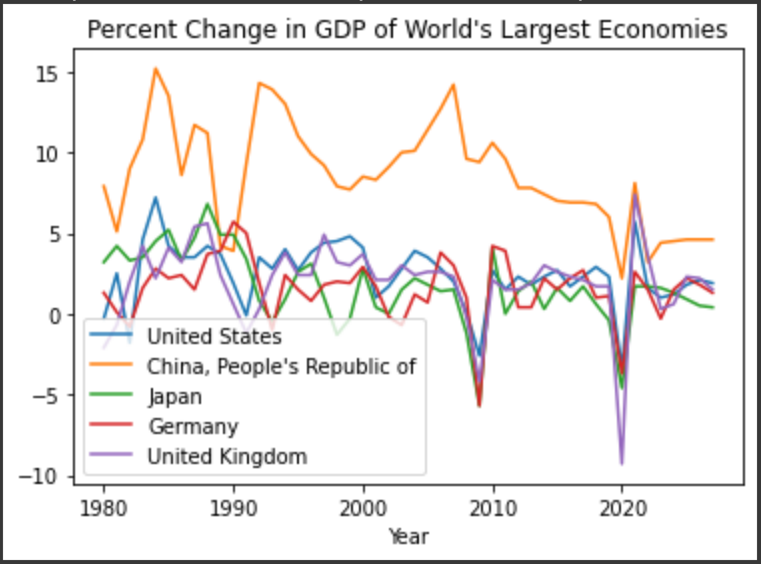
```
df_gdp_clean.head()
```

	United States	China, People's Republic of	Japan	Germany	United Kingdom
Year					
1980	-0.3	7.9	3.2	1.3	-2.1
1981	2.5	5.1	4.2	0.1	-0.7
1982	-1.8	9.0	3.3	-0.8	2.0
1983	4.6	10.8	3.5	1.6	4.2
1984	7.2	15.2	4.5	2.8	2.2

```
df_gdp_clean.plot(
    kind="line",
    title="Percent Change in GDP of World's Largest Economies"
)
```

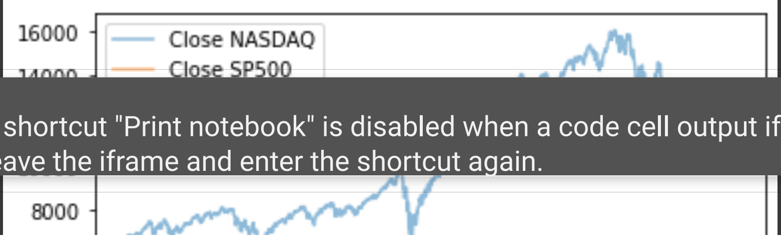
```
<matplotlib.axes._subplots.AxesSubplot at 0x7f5c6bf6aa90>
```



Percent Change in GDP of World's Largest Economies

```
df_stocks_crypto[[
    "Close NASDAQ", "Close SP500", "Close ETH"
]].plot(
    kind="line",
    alpha=0.5
)
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x7f5c6bef2bb0>
```



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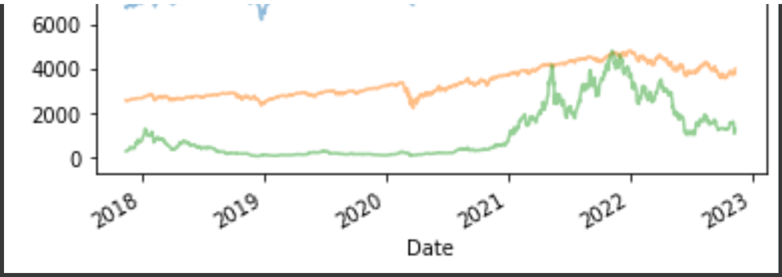

NEW DATASETS to CSV

Description

Transferring our new Clean Datasets to CSV's so we can work with it on a new notebook.

```
from google.colab import drive
drive.mount('/content/drive')
df_ethereum_clean.to_csv("/content/drive/MyDrive/ethereum.csv")
df_stocks_crypto.to_csv("/content/drive/MyDrive/stocks_crypto.csv")
```

```
    Mounted at /content/drive
```

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