Getting Started with Matplotlib

We need matplotlib.pyplot for plotting

```
import matplotlib.pyplot as plt
import pandas as pd
```

About the Data

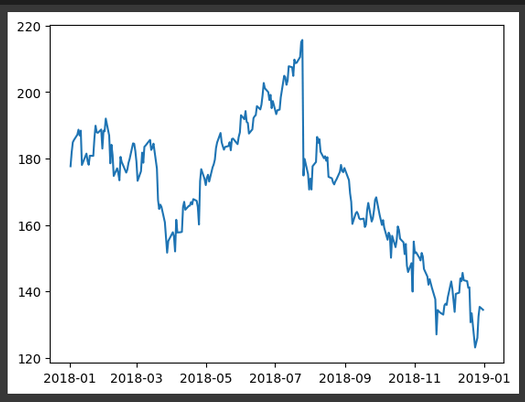
In this notebook, we will be working with 2 datasets:

- Facebook's stock price throughout 2018 (obtained using the stock_analysis package)
- Earthquake data from September 18, 2018 - October 13, 2018 (obtained from the US Geological Survey (USGS) using the USGS API)

Plotting lines

```
fb = pd.read_csv(
    "/content/fb_stock_prices_2018.csv", index_col = 'date', parse_dates=True
)

plt.plot(fb.index, fb.open)
plt.show()
```



Since we are working in a Jupyter notebook, we can use the magic command %matplotlib inline once and not have to call plt.show() for each plot.

```
# NOTE when Using Jupyter Notebook, Use This !!
%matplotlib inline

fb = pd.read_csv(
    "/content/fb_stock_prices_2018.csv", index_col = 'date', parse_dates = True
)

plt.plot(fb.index, fb.open)
```

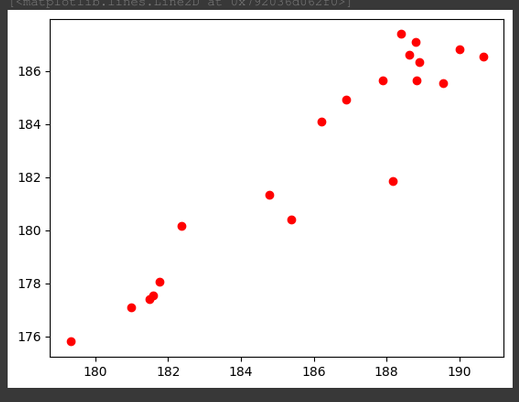
```
[<matplotlib.lines.Line2D at 0x792036f6d150>]
```

Scatter plots

We can pass in a string specifying the style of the plot. This is of the form '[color][marker][linestyle]'. For example, we can make a black dashed line with 'k--' or a red scatter plot with 'ro' :

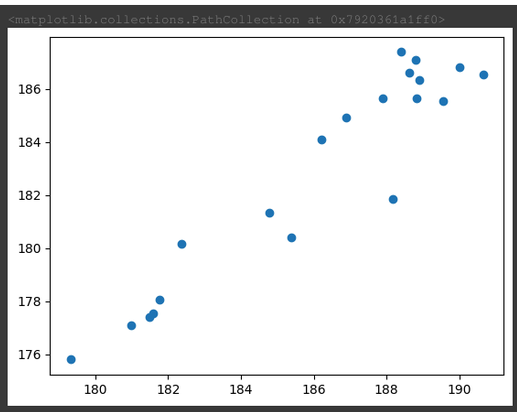
```
plt.plot('high', 'low', 'ro', data=fb.head(20))
# ro red dots
# k-- black dash lines
```

```
[<matplotlib.lines.Line2D at 0x792036d062f0>]
```




```
# or just use scatter()
plt.scatter('high', 'low',data=fb.head(20))
```

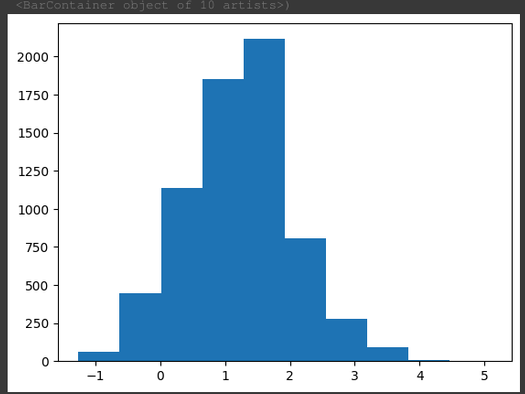
```
<matplotlib.collections.PathCollection at 0x7920361a1ff0>
```



Histograms

```
1 quakes = pd.read_csv('/content/earthquakes.csv')
2 plt.hist(quakes.query('magType == "ml"').mag)
```

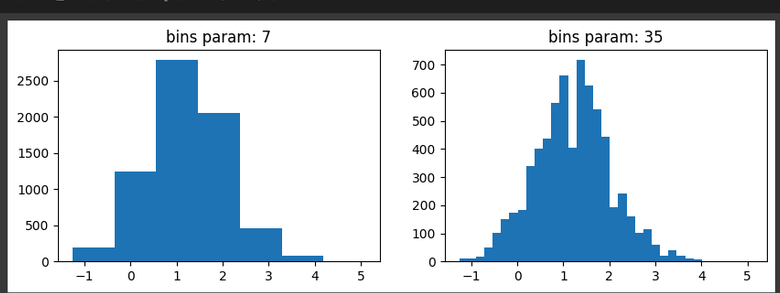
```
(array([6.400e+01, 4.450e+02, 1.137e+03, 1.853e+03, 2.114e+03, 8.070e+02,
        2.800e+02, 9.200e+01, 9.000e+00, 2.000e+00]),
 array([-1.26 , -0.624,  0.012,  0.648,  1.284,  1.92 ,  2.556,  3.192,
         3.828,  4.464,  5.1  ]),
 <BarContainer object of 10 artists>)
```



Bin size matters

Notice how our assumptions of the distribution of the data can change based on the number of bins (look at the drop between the two highest peaks on the righthand plot):

```
1 x = quakes.query('magType == "ml"').mag
2 fig, axes = plt.subplots(1, 2, figsize=(10, 3))
3 for ax, bins in zip(axes, [7, 35]):
4   ax.hist(x, bins=bins)
5   ax.set_title(f'bins param: {bins}')
```



Plot components

```
Figure
```

Top-level object that holds the other plot components.

```
1 fig = plt.figure()
```

```
<Figure size 640x480 with 0 Axes>
```

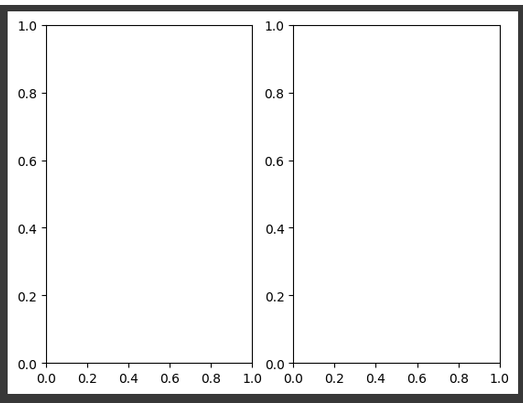
```
Axes
```

Individual plots contained within the Figure

Creating subplots

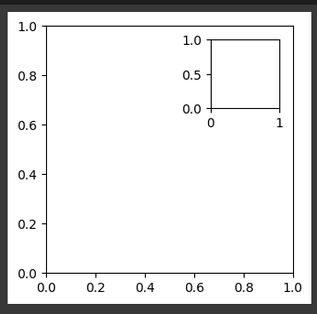
Simply specify the number of rows and columns to create:

```
1 fig, axes = plt.subplots(1,2) # subplot(rows,col)
```



s an alternative to using plt.subplots() we can add the Axes to the Figure on our own. This allows for some more complex layouts, such as picture in picture:

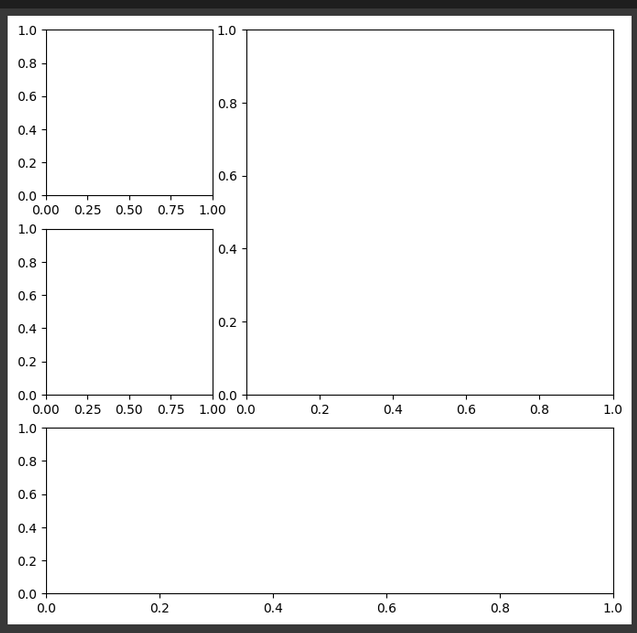
```
fig = plt.figure(figsize = (3,3))
outside = fig.add_axes([0.1, 0.1, 0.9, 0.9])
inside = fig.add_axes([0.7, 0.7, 0.25, 0.25])
```



Creating Plot Layouts with gridspec

We can create subplots with varying sizes as well

```
fig = plt.figure(figsize=(8,8))
gs = fig.add_gridspec(3, 3)
top_left = fig.add_subplot(gs[0,0]) # adding plot by gripspec['coordinates]
mid_left = fig.add_subplot(gs[1,0])
top_right = fig.add_subplot(gs[:2, 1:]) # lets you conquer other parts of the grid
bottom = fig.add_subplot(gs[2, :]) # all of the grid x = 2
```



Saving Plots

Use plt.savefig() to save the last created plot. To save a specific Figure object, use its savefig() method

```
fig.savefig('empty.png')
```

Cleaning up

t's important to close resources when we are done with them. We use plt.close() to do so. If we pass in nothing, it will close the last plot, but we can pass the specific Figure to close or say 'all' to close all Figure objects that are open. Let's close all the Figure objects that are open with plt.close() :

```
plt.close('all') # closing the tables in plt
```

Additional plotting options

Specifying figure size

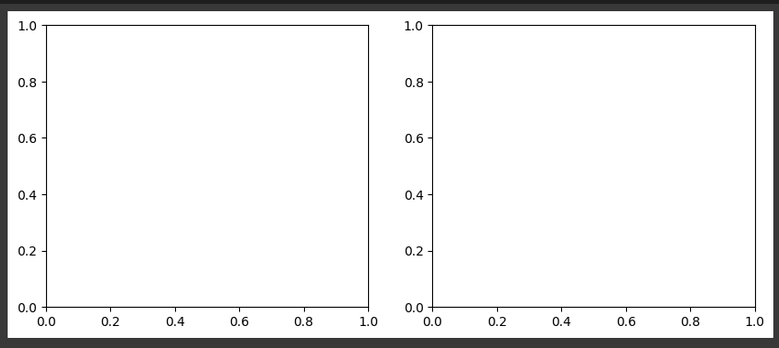
Just pass the figsize parameter to plt.figure() . It's a tuple of (width, height):

```
fig = plt.figure(figsize=(10,4))
```

```
<Figure size 1000x400 with 0 Axes>
```

This can be specified when creating subplots as well:

```
fig, axes = plt.subplots(1,2,figsize=(10,4))
```




```
rcParams
```

A small subset of all the available plot settings (shuffling to get a good variation of options):

```
import random
import matplotlib as mpl

rcparams_list = list(mpl.rcParams.keys())
random.seed(20)
random.shuffle(rcparams_list)
sorted(rcparams_list[:20])
```

```
['animation.convert_args',
 'axes.edgecolor',
 'axes.formatter.use_locale',
 'axes.spines.right',
 'boxplot.meanprops.markersize',
 'boxplot.showfliers',
 'keymap.home',
 'lines.markerfacecolor',
 'lines.scale_dashes',
 'mathtext.rm',
 'patch.force_edgecolor',
 'savefig.facecolor',
 'svg.fonttype',
 'text.hinting_factor',
 'xtick.alignment',
 'xtick.minor.top',
 'xtick.minor.width',
 'ytick.left',
 'ytick.major.left',
 'ytick.minor.width']
```

We can check the current default figsize using rcParams :

```
mpl.rcParams['figure.figsize']
```

```
[6.4, 4.8]
```

We can also update this value to change the default (until the kernel is restarted):

```
mpl.rcParams['figure.figsize'] = (300,10)
mpl.rcParams['figure.figsize']
```

```
[300.0, 10.0]
```

```
mpl.rcdefaults()
mpl.rcParams['figure.figsize']
```

```
[6.4, 4.8]
```

this code can be also done in pyplot

```
plt.rc('figure', figsize=(20, 20))
plt.rcdefaults()
```