Getting Started with Matplotlib

We need matplotlib.pyplot for plotting.

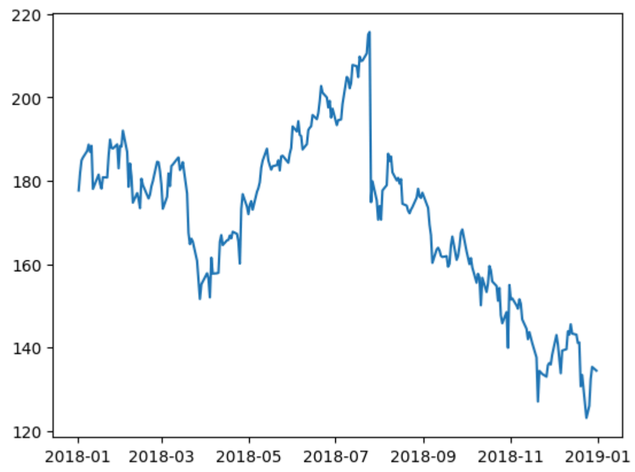
```
import matplotlib.pyplot as plt
import pandas as pd
```

About the Data

Plotting lines

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

plt.plot(fb.index, fb.open) # plot x and y values
plt.show() #.show() to show
```




```
%matplotlib inline
# this syntax would allow us to not use the .show() function
import matplotlib.pyplot as plt
import pandas as pd

fb = pd.read_csv(
  'fb_stock_prices_2018.csv', index_col='date', parse_dates=True
)
plt.plot(fb.index, fb.open)
```

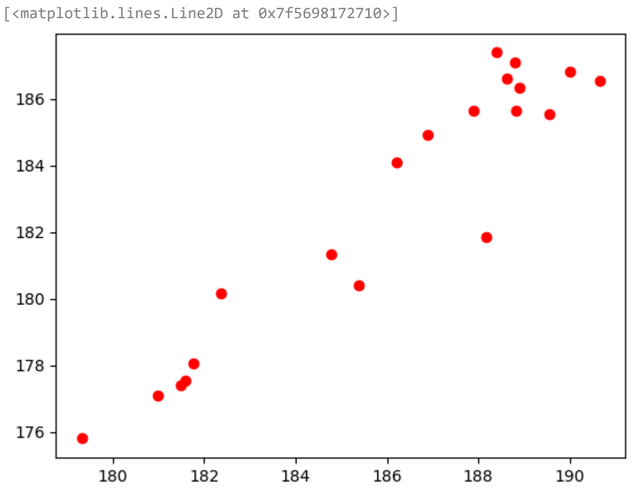
```
[<matplotlib.lines.Line2D at 0x7f569831ad10>]
```


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)) # plotted using high, low
# ro presents a red scatter plot
```

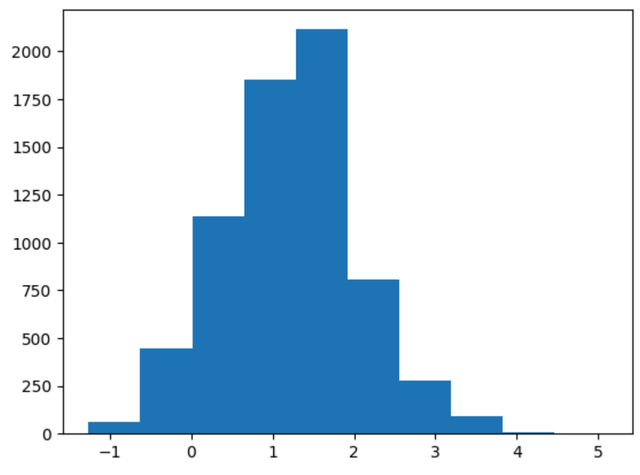
```
[<matplotlib.lines.Line2D at 0x7f5698172710>]
```



Histograms

```
quakes = pd.read_csv('earthquakes.csv')
plt.hist(quakes.query('magType == "ml"').mag) # histogram gets the magnitude of magType ml
```

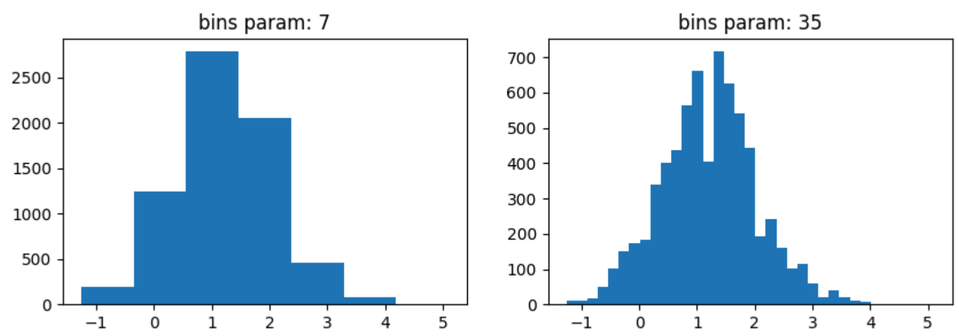
```
(array([6.400e+01, 4.450e+02, 1.137e+03, 1.853e+03, 2.114e+03, 8.070e+02,
        2.800e+02, 9.200e+01, 9.000e+00, 2.000e+00]),
 array([-1.26 , -0.624,  0.012,  0.648,  1.284,  1.92 ,  2.556,  3.192,
         3.828,  4.464,  5.1  ]),
 <BarContainer object of 10 artists>)
```



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):

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



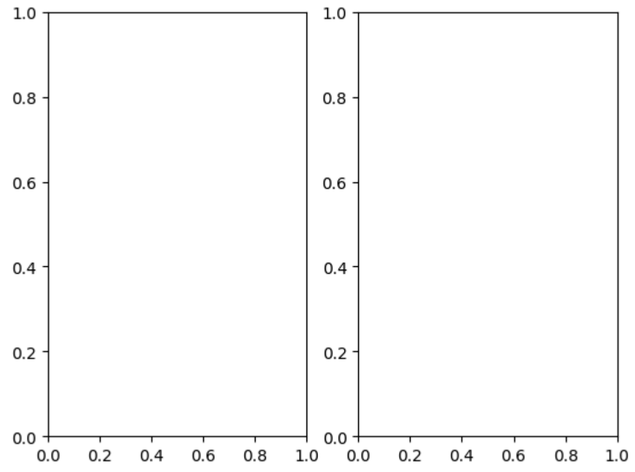
Plot components

```
fig = plt.figure() # returns default size
```

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

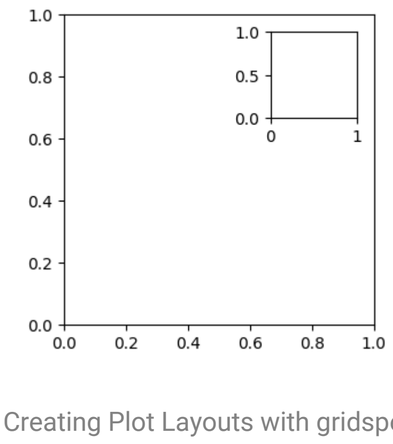
Creating subplots

```
fig, axes = plt.subplots(1, 2) # 1 row 2 columns
```



As 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:

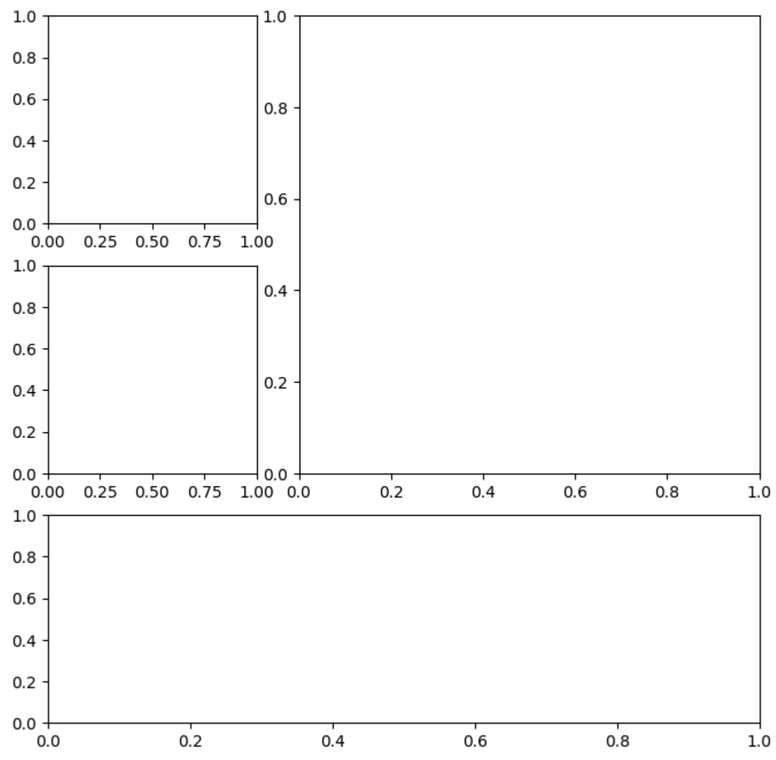
```
fig = plt.figure(figsize=(3, 3))
outside = fig.add_axes([0.1, 0.1, 0.9, 0.9])
inside = fig.add_axes([0.7, 0.7, 0.25, 0.25])
```



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) # set grid size
top_left = fig.add_subplot(gs[0, 0]) # coordinates
mid_left = fig.add_subplot(gs[1, 0])
top_right = fig.add_subplot(gs[:2, 1:])
bottom = fig.add_subplot(gs[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') # save plot using picture
```

Cleaning up

It's important to close resources when we are done with them. We use Figure to close or say 'all' to close all plt.close() to do so. If we pass in nothing, it will close the last plot, but we can pass the specific Figure objects that are open. Let's close all the Figure objects that are open with plt.close() :

```
plt.close('all') # good practice to close resources to avoid corruption
```

Additional plotting options

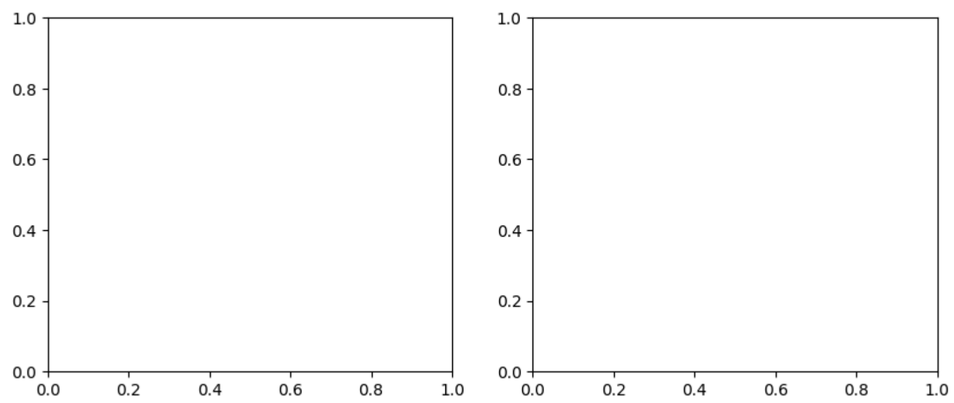
Specifying figure size

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>
```

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



rcParams

```
import random
import matplotlib as mpl

rcparams_list = list(mpl.rcParams.keys()) # list of rc params
random.seed(20) # make this repeatable
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'] # gets the default 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) # change figsize
mpl.rcParams['figure.figsize']
```

```
[300.0, 10.0]
```

Use rcdefaults() to restore the defaults

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

```
[6.4, 4.8]
```

This can also be done via pyplot :

```
plt.rc('figure', figsize=(20, 20)) # change figsize default to (20, 20)
plt.rcdefaults() # reset the default
```