Matplotlib

This serves as a cheat sheet for Matplotlib, a 2d plotting library for Python.

Not a total beginner? Jump straight down to the examples or get the jupyter notebook file. Also, the official example library is pretty sweet.

Index

1. Prepare Data

NumPy is probably your best friend for that. Check out my CheatSheet here

2. Plots

Creating plots

Figure

Operator	Description	Documentation
`fig = plt.figures()`	a container that contains all plot elements	link

Axes

Operator	Description	Documentation
`fig.add_axes()` `a = fig.add_subplot(222)`	Initializes subplot A subplot is an axes on a grid system row-col-num, see examples	link link
`fig, b = plt.subplots(nrows=3, nclos=2)`	Adds subplot	link
`ax = plt.subplots(2, 2)`	Creates subplot	link

Axes are very useful for subplots. See example here

After configuring your plot, you must use `plt.show()` to make it visible

Plotting

1D Data

Operator	Description	Documentation
`lines = plt.plot(x,y)`	Plot data connected by lines	link
`plt.scatter(x,y)`	Creates a scatterplot, unconnected data points	link
`plt.bar(xvalue, data , width,`	simple vertical	link

`color...)`	bar chart	link	
`plt.barh(yvalue, data, width, color...)`	simple horizontal bar	link	
`plt.hist(x, y)`	Plots a histogram	link	
`plt.boxplot(x,y)`	Box and Whisker plot		link
`plt.violinplot(x, y)`	Creates violin plot	link	
`ax.fill(x, y, color='lightblue')` `ax.fill_between(x,y,color='yellow')`	Fill area under/between plots	link	

For more advanced box plots, start here

2D Data

Operator	Description	Documentation
`fig, ax = plt.subplots()` `im = ax.imshow(img, cmap, vmin...)`	Colormapped or RGB arrays	link

Suggestions?

Saving plots

Operator	Description	Documentation
`plt.savefig('pic.png')`	Saves plot/figure to image	link
`plt.savefig('transparentback.png')`	Saves transparent plot/figure to image	see above

Customization

Color

Operator	Description	Documentation
`plt.plot(x, y, color='lightblue')` `plt.plot(x, y, alpha = 0.4)`	colors plot to color blue	link
`plt.colorbar(mappable, orientation='horizontal')`	`mappable` : the Image, Contourset etc to which colorbar applies	link

Markers (see examples)

Operator	Description	Documentation
`plt.plot(x, y, marker='*')`	adds `*` for every data point	link
`plt.scatter(x, y, marker='.')`	adds . for every data point	see above

Lines

Operator	Description	Documentation
`plt.plot(x, y, linewidth=2)`	Sets line width	link
`plt.plot(x, y, ls='solid')`	Sets linestyle, `ls` can be ommitted, see 2 below	see above
`plt.plot(x, y, ls='--')`	Sets linestyle, `ls` can be ommitted, see below	see above
`plt.plot(x,y,'--', x**2, y**2, '-.')`	Lines are '--' and '_.', see example	see above
`plt.setp(lines,color='red',linewidth=2)`	Sets properties of plot `lines`	link

Text

Operator	Description	Documentation
`plt.text(1, 1,'Example Text',style='italic')`	Places text at coordinates 1/1	link
`ax.annotate('some annotation', xy=(10, 10))`	Annotate the point with coordinates `xy` with text `s`	link
`plt.title(r'$delta_i=20$', fontsize=10)`	Mathtext	link

Limits, Legends/Labels , Layout

Limits

Operator	Description	Documentation
`plt.xlim(0, 7)`	Sets x-axis to display 0 - 7	link
`plt.ylim(-0.5, 9)`	Sets y-axis to display -0.5 - 9	link
`ax.set(xlim=[0, 7], ylim=[-0.5, 9])` `ax.set_xlim(0, 7)`	Sets limits	link link
`plt.margins(x=1.0, y=1.0)`	Set margins: add padding to a plot, values 0 - 1	
`plt.axis('equal')`	Set the aspect ratio of the plot to 1	

Legends/Labels

Operator	Description	Documentation
`plt.title('just a title')`	Sets title of plot	link
`plt.xlabel('x-axis')`	Sets label next to x-axis	link
`plt.ylabel('y-axis')``	Sets label next to y-axis	link
`ax.set(title='axis', ylabel='Y-Axis', xlabel='X-Axis')`	Set title and axis labels	link

`ax.legend(loc='best')`	No overlapping plot elements	link

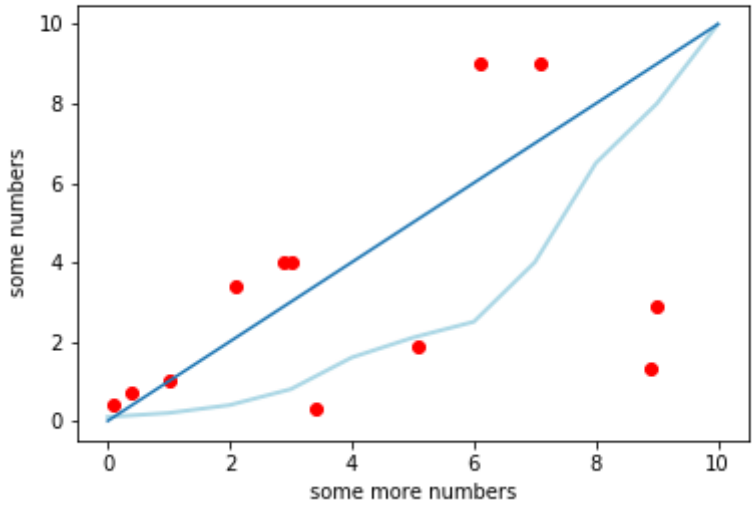
Ticks

Operator	Description	Documentation
`plt.xticks(x, labels, rotation='vertical')`	Set ticks, example	link
`ax.xaxis.set(ticks=range(1,5), ticklabels=[3,100,-12,"foo"])`	Set x-ticks	link
`ax.tick_params(axis='y', direction='inout', length=10)`	Make y-ticks longer and go in and out	link

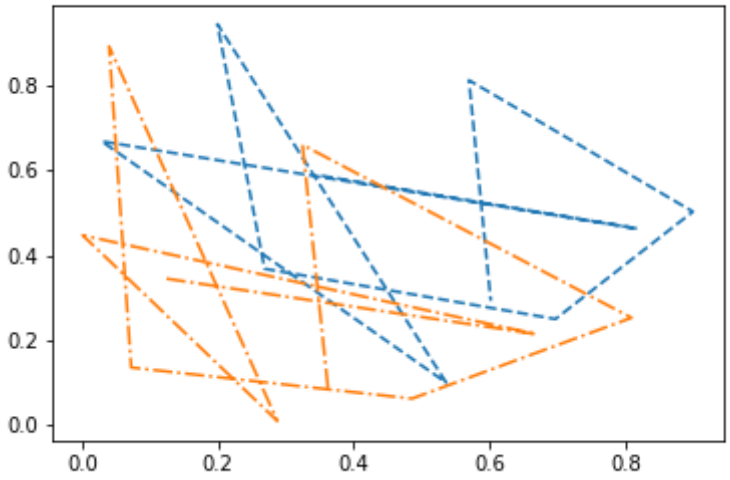
Examples

Basics

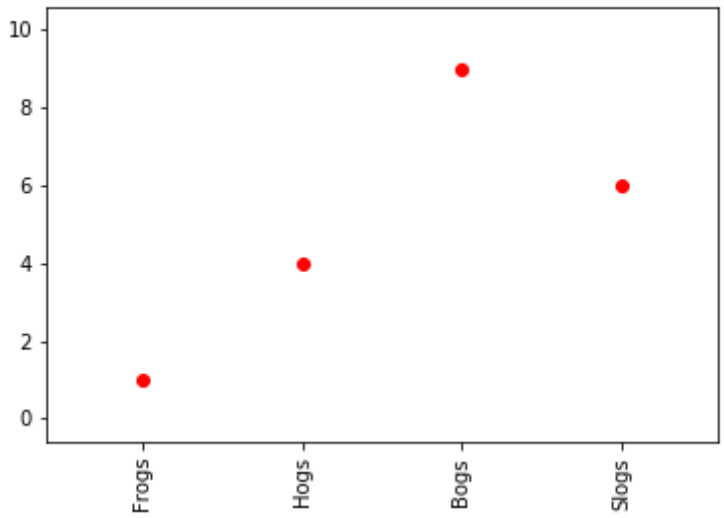
```
import matplotlib.pyplot as plt

x = [1, 2.1, 0.4, 8.9, 7.1, 0.1, 3, 5.1, 6.1, 3.4, 2.9, 9]
y = [1, 3.4, 0.7, 1.3, 9, 0.4, 4, 1.9, 9, 0.3, 4.0, 2.9]
plt.scatter(x,y, color='red')

w = [0.1, 0.2, 0.4, 0.8, 1.6, 2.1, 2.5, 4, 6.5, 8, 10]
z = [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10]
plt.plot(z, w, color='lightblue', linewidth=2)

c = [0,1,2,3,4, 5, 6, 7, 8, 9, 10]
plt.plot(c)

plt.ylabel('some numbers')
plt.xlabel('some more numbers')
plt.show()
```




```
import matplotlib.pyplot as plt
import numpy as np

x = np.random.rand(10)
y = np.random.rand(10)

plt.plot(x,y,'--', x**2, y**2,'-.')
plt.savefig('lines.png')
plt.show()
```

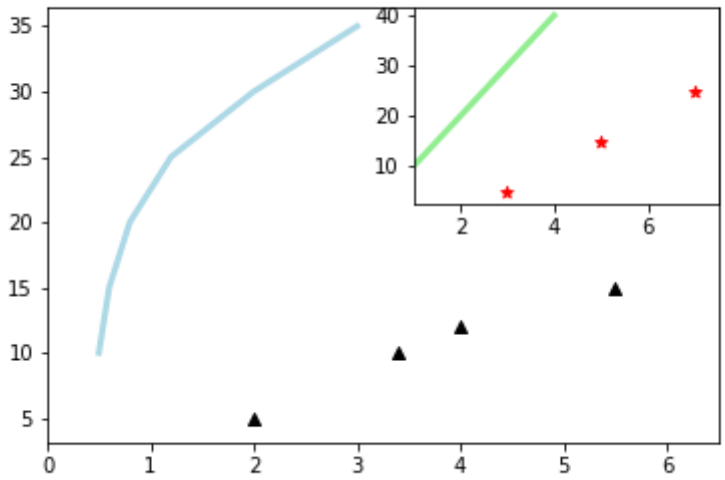


```
import matplotlib.pyplot as plt


x = [1, 2, 3, 4]
y = [1, 4, 9, 6]
labels = ['Frogs', 'Hogs', 'Bogs', 'Slogs']

plt.plot(x, y, 'ro')
# You can specify a rotation for the tick labels in degrees or with keyword
s.
plt.xticks(x, labels, rotation='vertical')
# Pad margins so that markers don't get clipped by the axes
plt.margins(0.2)
plt.savefig('ticks.png')
plt.show()
```



Subplotting Examples

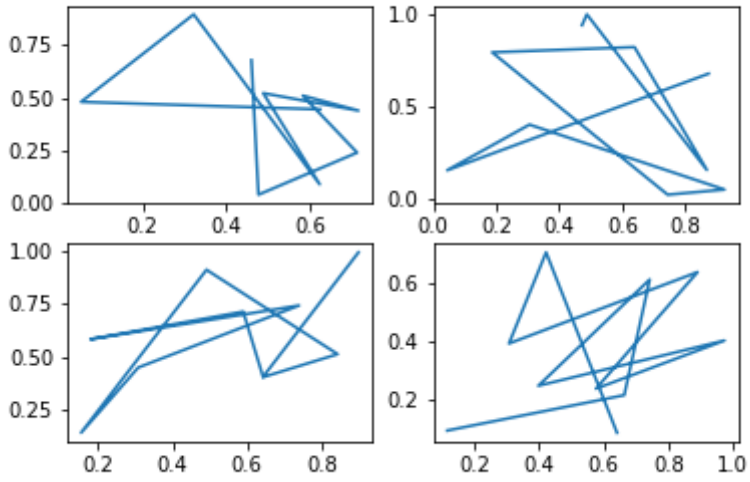
```
import matplotlib.pyplot as plt

x = [0.5, 0.6, 0.8, 1.2, 2.0, 3.0]
y = [10, 15, 20, 25, 30, 35]
z = [1, 2, 3, 4]
w = [10, 20, 30, 40]

fig = plt.figure()
ax =  fig.add_subplot(111)
ax.plot(x, y, color='lightblue', linewidth=3)
ax.scatter([2,3.4,4, 5.5],
               [5,10,12, 15],
               color='black',
               marker='^')
ax.set_xlim(0, 6.5)

ax2 =  fig.add_subplot(222)
ax2.plot(z, w, color='lightgreen', linewidth=3)
ax2.scatter([3,5,7],
               [5,15,25],
               color='red',
               marker='*')
ax2.set_xlim(1, 7.5)

plt.savefig('mediumplot.png')
plt.show()
```



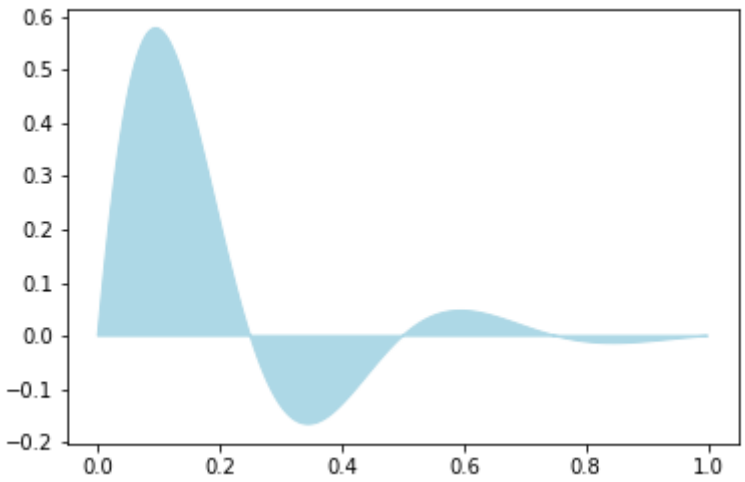
Thanks to this guy for this good example

```
import numpy as np
import matplotlib.pyplot as plt

# First way #

x = np.random.rand(10)
y = np.random.rand(10)

figure1 = plt.plot(x,y)

# Second way #

x1 = np.random.rand(10)
x2 = np.random.rand(10)
x3 = np.random.rand(10)
x4 = np.random.rand(10)
y1 = np.random.rand(10)
y2 = np.random.rand(10)
y3 = np.random.rand(10)
y4 = np.random.rand(10)

figure2, ((ax1, ax2), (ax3, ax4)) = plt.subplots(2, 2)
ax1.plot(x1,y1)
ax2.plot(x2,y2)
ax3.plot(x3,y3)
ax4.plot(x4,y4)

plt.show()
```

If you haven't used NumPy before, check out my cheat sheet



```
import numpy as np
import matplotlib.pyplot as plt

x = np.linspace(0, 1, 500)
y = np.sin(4 * np.pi * x) * np.exp(-5 * x)

fig, ax = plt.subplots()

ax.fill(x, y, color='lightblue')
plt.show()
```

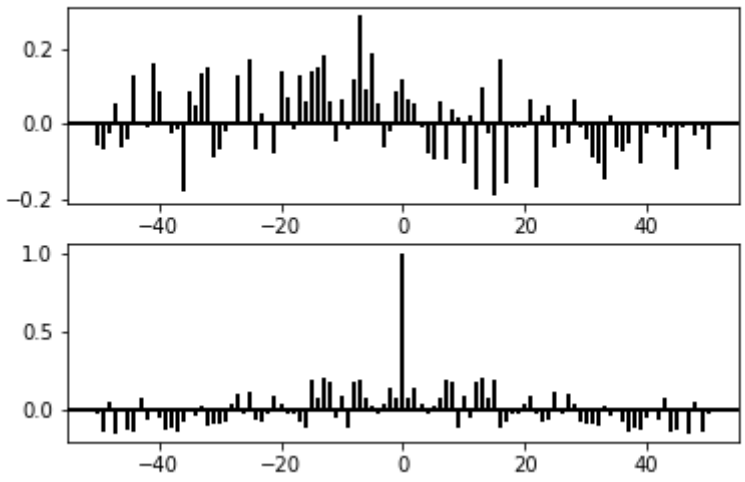


source

Advanced

Taken from official docs

```
import matplotlib.pyplot as plt
import numpy as np


np.random.seed(0)

x, y = np.random.randn(2, 100)
fig = plt.figure()
ax1 = fig.add_subplot(211)
ax1.xcorr(x, y, usevlines=True, maxlags=50, normed=True, lw=2)
ax1.grid(True)
ax1.axhline(0, color='black', lw=2)

ax2 = fig.add_subplot(212, sharex=ax1)
ax2.acorr(x, usevlines=True, normed=True, maxlags=50, lw=2)
ax2.grid(True)
ax2.axhline(0, color='black', lw=2)

plt.show()
```



Sources: Datacamp, Official Docs and Quandl