Matplotlib for beginners

Matplotlib is a library for making 2D plots in Python. It is designed with the philosophy that you should be able to create simple plots with just a few commands:

1 Initialize

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

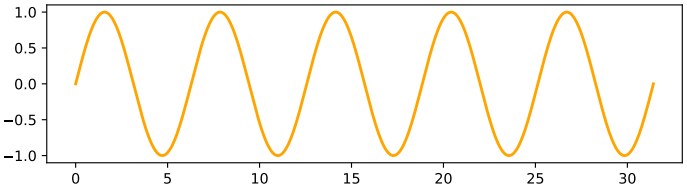
2 Prepare

```
X = np.linspace(0, 4*np.pi, 1000)
Y = np.sin(X)
```

3 Render

```
plt.plot(X, Y)
plt.show()
```

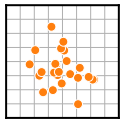
4 Observe



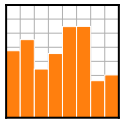
Choose

Matplotlib offers several kind of plots (see Gallery):

```
X = np.random.uniform(0, 1, 100)
Y = np.random.uniform(0, 1, 100)
plt.scatter(X, Y)
```



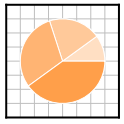
```
X = np.arange(10)
Y = np.random.uniform(1, 10, 10)
plt.bar(X, Y)
```



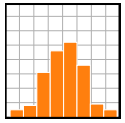
```
Z = np.random.uniform(0, 1, (8,8)

plt.imshow(Z)
```

```
Z = np.random.uniform(0, 1, (8,8)

plt.contourf(Z)
```

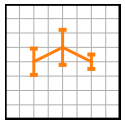
```
Z = np.random.uniform(0, 1, 4)

plt.pie(Z)
```



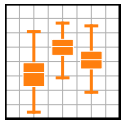
```
Z = np.random.normal(0, 1, 100)

plt.hist(Z)
```



```
X = np.arange(5)
Y = np.random.uniform(0,1,5)
plt.errorbar(X, Y, Y/4)
```



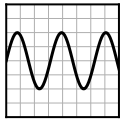
```
Z = np.random.normal(0,1,(100,3))

plt.boxplot(Z)
```



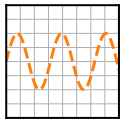
Tweak

You can modify pretty much anything in a plot, including limits, colors, markers, line width and styles, ticks and ticks labels, titles, etc.

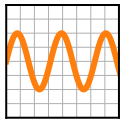
```
X = np.linspace(0,10,100)
Y = np.sin(X)
plt.plot(X, Y, color="black")
```



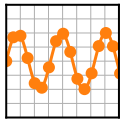
```
X = np.linspace(0,10,100)
Y = np.sin(X)
plt.plot(X, Y, linestyle="--")
```



```
X = np.linspace(0,10,100)
Y = np.sin(X)
plt.plot(X, Y, linewidth=5)
```



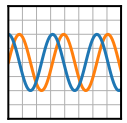
```
X = np.linspace(0,10,100)
Y = np.sin(X)
plt.plot(X, Y, marker="o")
```



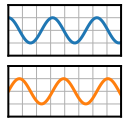
Organize

You can plot several data on the the same figure but you can also split a figure in several subplots (named *Axes*):

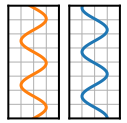
```
X = np.linspace(0,10,100)
Y1, Y1 = np.sin(X), np.cos(X)
plt.plot(X, Y1, Y2)
```



```
fig, (ax1, ax2) = plt.subplots((2,1))
ax1.plot(X, Y1, color="C1")
ax2.plot(X, Y2, color="C0")
```

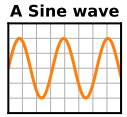


```
fig, (ax1, ax2) = plt.subplots((1,2))
ax1.plot(Y1, X, color="C1")
ax2.plot(Y2, X, color="C0")
```

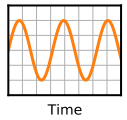


Label (everything)

```
plt.plot(X, Y)
plt.suptitle(None)
plt.title("A Sine wave")
```




```
plt.plot(X, Y)
plt.ylabel(None)
plt.xlabel("Time")
```



Explore

Figures are shown with a graphical user interface that allows to zoom and pan the figure, to navigate between the different views and to show the value under the mouse.

Save (bitmap or vector format)

```
plt.savefif("my-first-figure.png", dpi=300)
plt.savefig("my-first-figure.pdf")
```