

Python (3) Matplotlib

plot your results

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CEE 696

Plotting

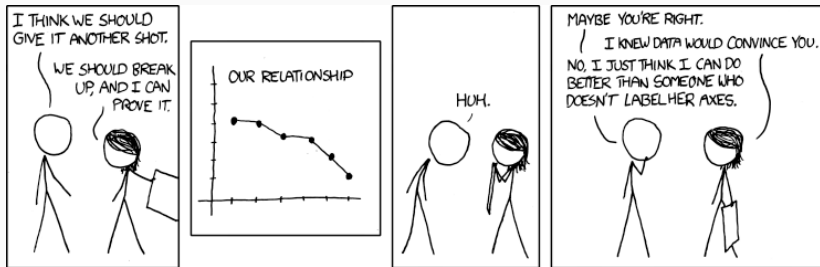


Figure 1: <https://xkcd.com/833/>

Before we start (1)

Q: so slow for updating skeletons

A: it should be only one-time task

Q: Project directory?

A: Somewhere convenient to you

Before we start (2)

Execution setting if you have any issues with virtualenv

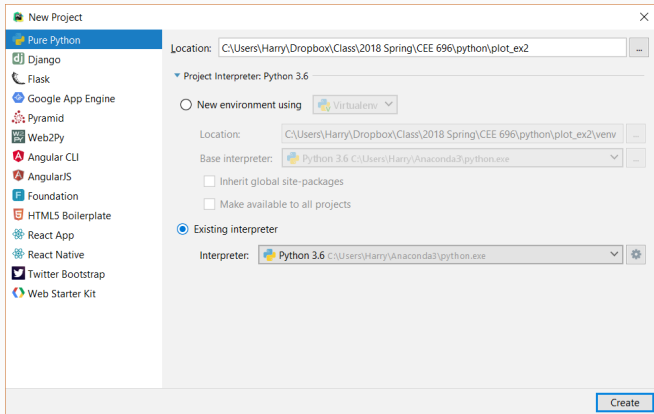


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Introduction

Matplotlib (pyplot) environment behave similar to MATLAB

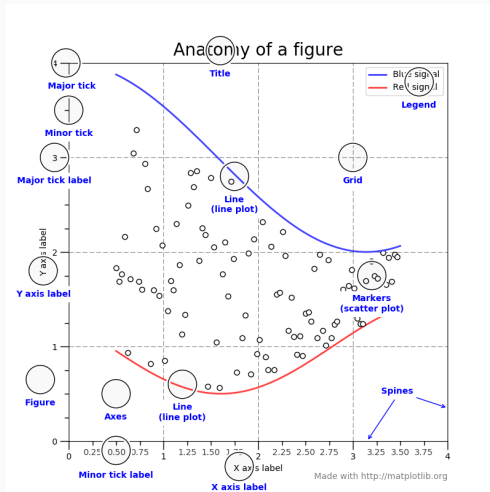
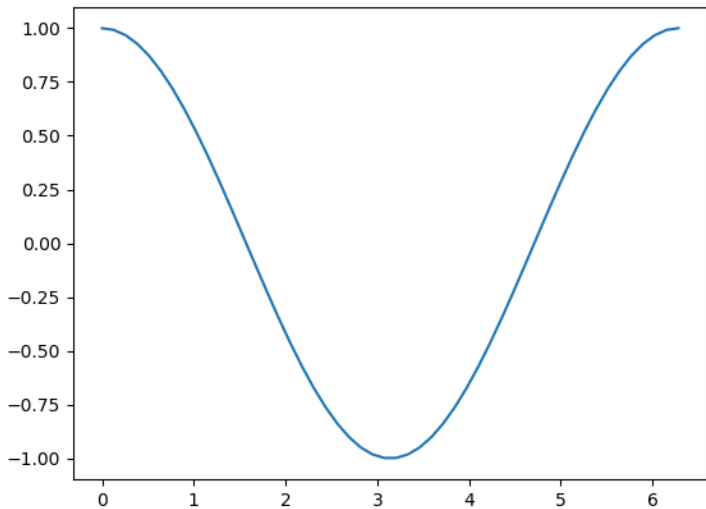


Figure 2: https://matplotlib.org/faq/usage_faq.html

```
import matplotlib.pyplot as plt
import numpy as np
# import matplotlib.pyplot as plt
x = np.linspace(0,2*np.pi, 50)
y = np.cos(x)
plt.figure()
plt.plot(x,y)
plt.show()
```

- `matplotlib.pyplot`
- Artist : `figure`, `axes`, `axis`, `text`
- backend : type `matplotlib.get_backend()`

save in pyCharm

The screenshot displays the PyCharm IDE interface. The main editor window shows a Python script named `plot1.py` with the following code:

```
1 import matplotlib.pyplot as plt
2 import numpy as np
3 x = np.linspace(0,2*np.pi, 50)
4 y = np.cos(x)
5 plt.figure()
6 plt.plot(x,y)
7 plt.show()
```

The code is executed, and a plot window titled `plot2` is open on the right. The plot shows a cosine wave with the x-axis ranging from 0 to 5 and the y-axis ranging from -1.00 to 1.00. A red box highlights the `Save as File` button in the plot window's toolbar.

The bottom panel of the IDE shows the Run console with the following output:

```
Python 6.2.1 -- An enhanced Interactive Python. Type '?' for help.
PyDev console: using IPython 6.2.1
Python 3.6.3 [Anaconda custom (64-bit)] (default, Nov 8 2017, 15:10:56) [MSC v.1900 64 bit (A
In[2]:
```

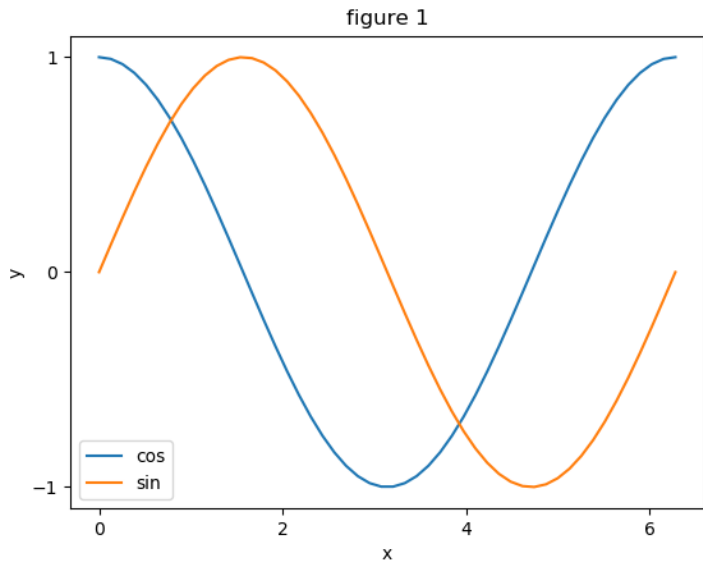
The bottom right corner of the IDE shows the Special Variables panel with the following variables:

```
> Special Variables
> x = (ndarray) ...View as Array
> y1 = (ndarray) ...View as Array
> y2 = (ndarray) ...View as Array
```

But you can save figures by `matplotlib.pyplot.savefig()`

my_first_plotting.py for publication quality

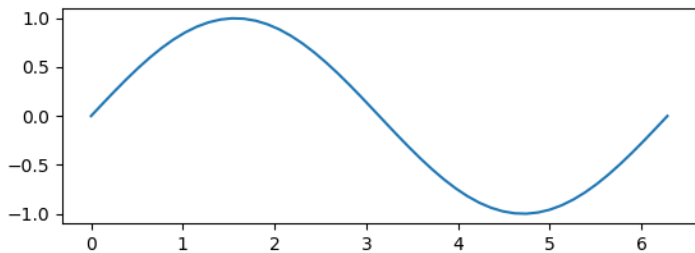
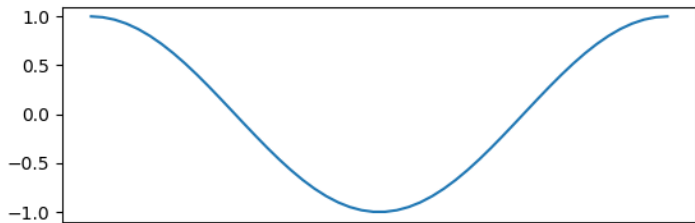
```
import matplotlib.pyplot as plt
import numpy as np
x = np.linspace(0,2*np.pi, 50)
y1 = np.cos(x)
y2 = np.sin(x)
plt.figure()
plt.plot(x,y1,label='cos')
plt.plot(x,y2,label='sin')
plt.xticks([0, 2, 4, 6])
plt.yticks([-1, 0, 1])
plt.title("figure 1")
plt.xlabel("x")
plt.ylabel("y")
plt.legend()
plt.savefig("myplot2.png")
plt.show()
```

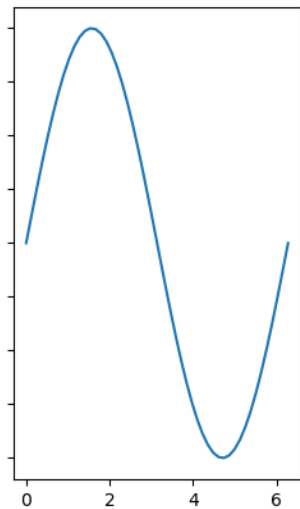
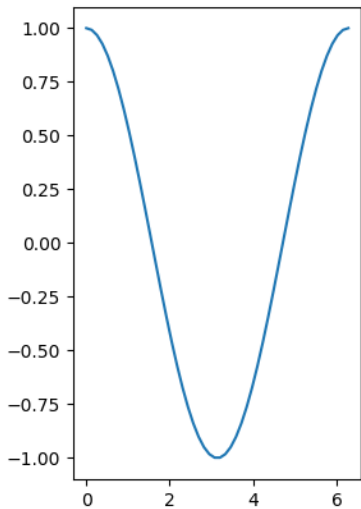


subplots?

[https://matplotlib.org/examples/pylab_examples/
subplots_demo.html](https://matplotlib.org/examples/pylab_examples/subplots_demo.html)

```
import matplotlib.pyplot as plt
import numpy as np
x = np.linspace(0,2*np.pi, 50)
y1 = np.cos(x)
y2 = np.sin(x)
# Two subplots in a column, the axes array is 1-d
f, axarr = plt.subplots(2,1, sharex=True)
axarr[0].plot(x, y1)
axarr[1].plot(x, y2)
plt.savefig("myplot3.png")
plt.show()
# Two subplots side by side
f, axarr = plt.subplots(1, 2, sharey=True)
axarr[0].plot(x, y1)
axarr[1].plot(x, y2)
plt.savefig("myplot4.png")
plt.show()
```





Resources

Matplotlib gallery is your friend

<https://matplotlib.org/gallery.html>

3 hour comprehensive tutorial by Ben Root

<https://youtu.be/rARMKS8jE9g>

\$ 5 e-book for now (deal may be expired soon!)

<https://www.packtpub.com/application-development/interactive-applications-using-matplotlib>