ESCI 386 – Scientific Programming, Analysis and Visualization with Python

Lesson 12 - Multiple-Panel Plots

Multi-panel Plots Using `subplot()`

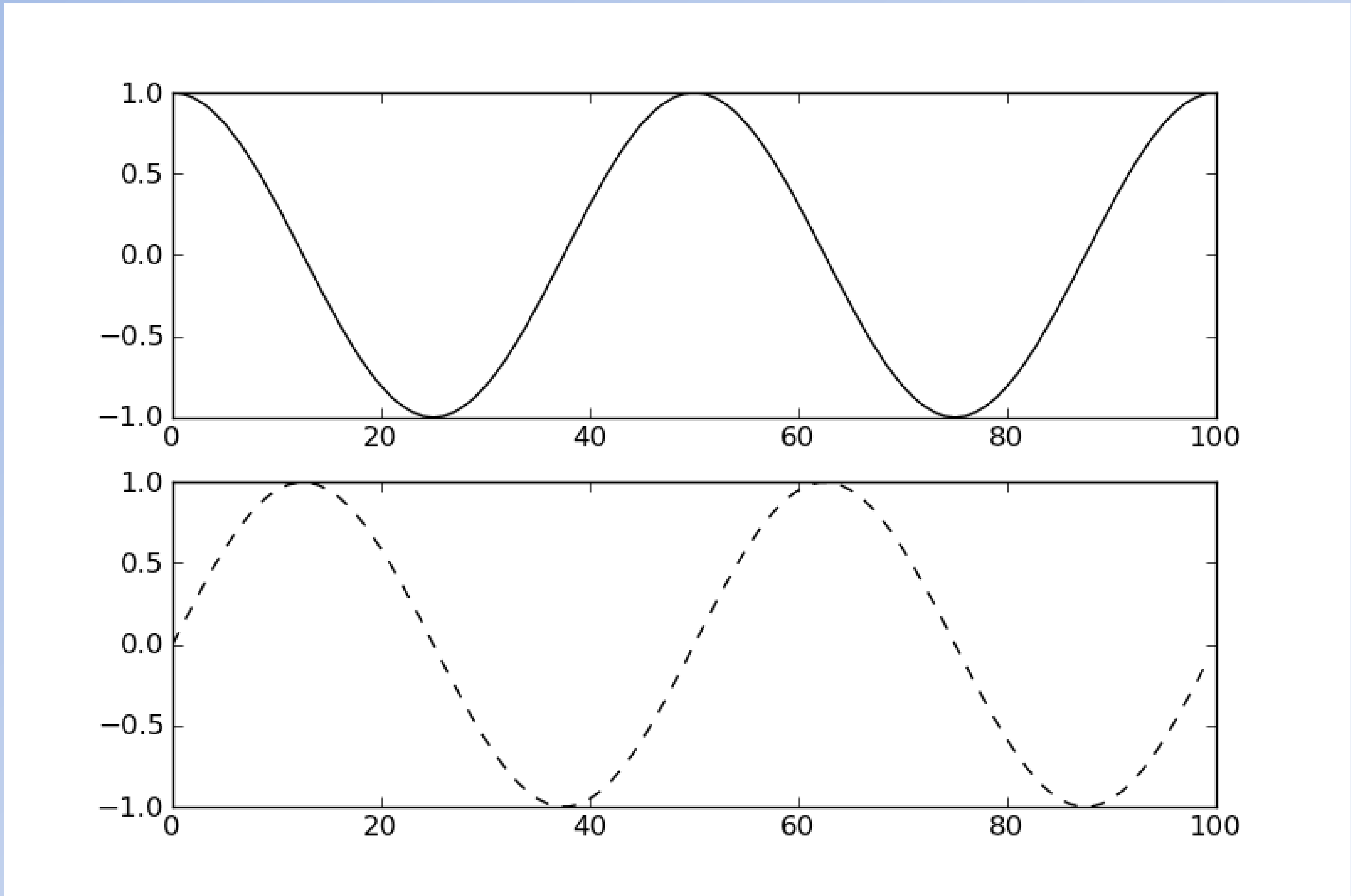
- To create multi panel plots we use `subplot(`*`rcp`*`)`, which is either a pyplot function or a figure method.
- `subplot(`*`rcp`*`)` creates an axes object on the figure for which it is called, or on the current figure if called as a pyplot function.
- The arguments are:
  - *`r`* the number of rows for the subplots
  - *`c`* the number of columns for the subplots
  - *`p`* the subplot number

subplot() Example

```
import matplotlib.pyplot as plt
import numpy as np
x = np.arange(0,100.0)
y1 = np.cos(2*np.pi*x/50.0)
y2 = np.sin(2*np.pi*x/50.0)
ax1 = plt.subplot(211) # creates first axis
ax1.plot(x, y1, 'k-')
ax2 = plt.subplot(212) # creates second axis
ax2.plot(x, y2, 'k--')
plt.show()
```

File: subplot-example.py

`subplot()` Result



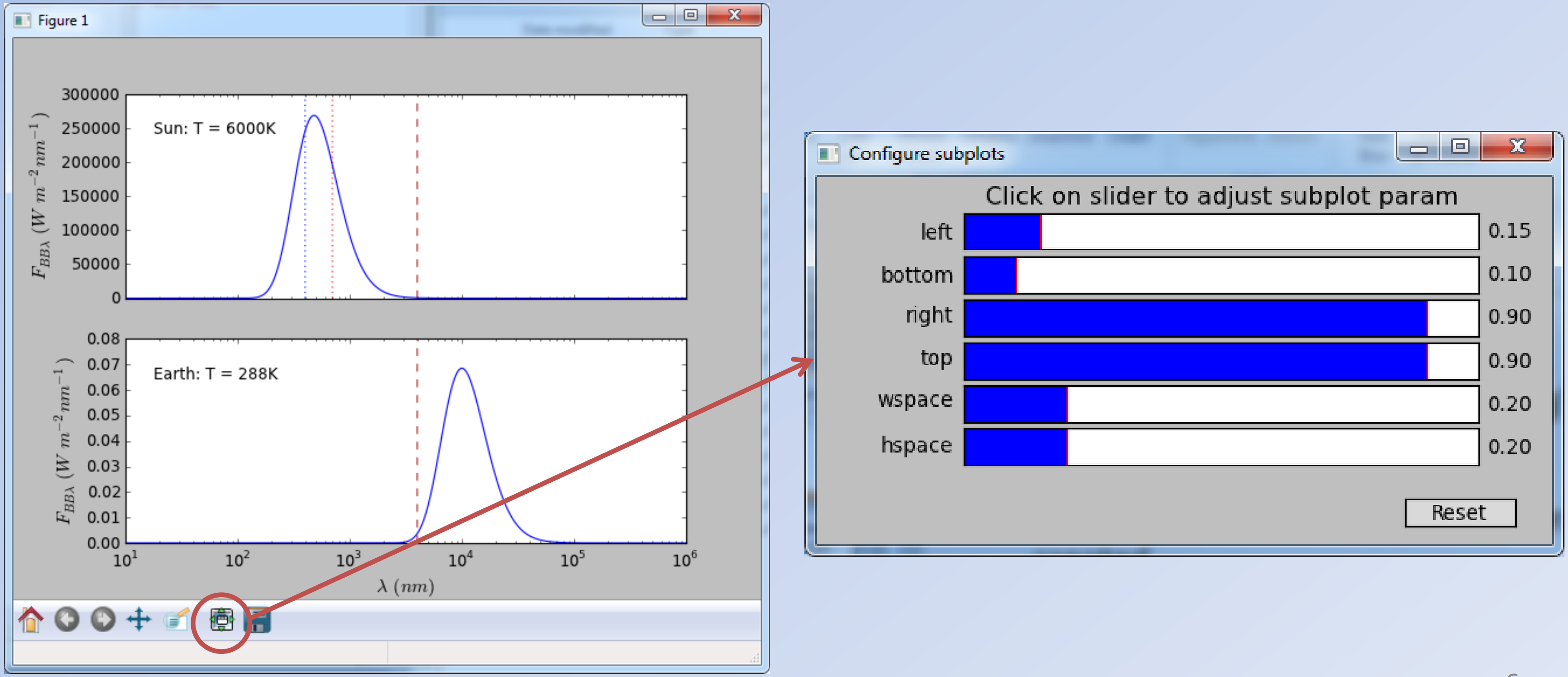
Adjusting Subplot Alignment

- The `subplots_adjust()` pyplot function or figure method is used for controlling the spacing between and around subplots.

Keyword	Description
`left`	The position of the left side of the subplots in axes coordinates (0 to 1.0)
`bottom`	The position of the bottom of the subplots in axes coordinates (0 to 1.0)
`right`	The position of the right side of the subplots in axes coordinates (0 to 1.0)
`top`	The position of the top of the subplots in axes coordinates (0 to 1.0)
`wspace`	The spacing between columns in points
`hspace`	The spacing between rows in points

Adjusting Subplot Alignment

- Subplots can also be adjusted interactively once the plot is created.
- In the plot window, click on the icon shown.



Click on slider to adjust subplot param

left	0.15
bottom	0.10
right	0.90
top	0.90
wspace	0.20
hspace	0.20

Multi-panel Plots Using `subplots()`

- An alternate method for creating subplots is with the `pyplot.subplots()` function (note the plural here!).

- This function creates the figure and all axes at one time.

Using `subplots()`

- The usage is

  ```
  fig, ax = plt.subplots(r,c)
  ```

  - *r* is the number of rows
  - *c* is the number of columns

- `fig` is a reference to the figure that is created.

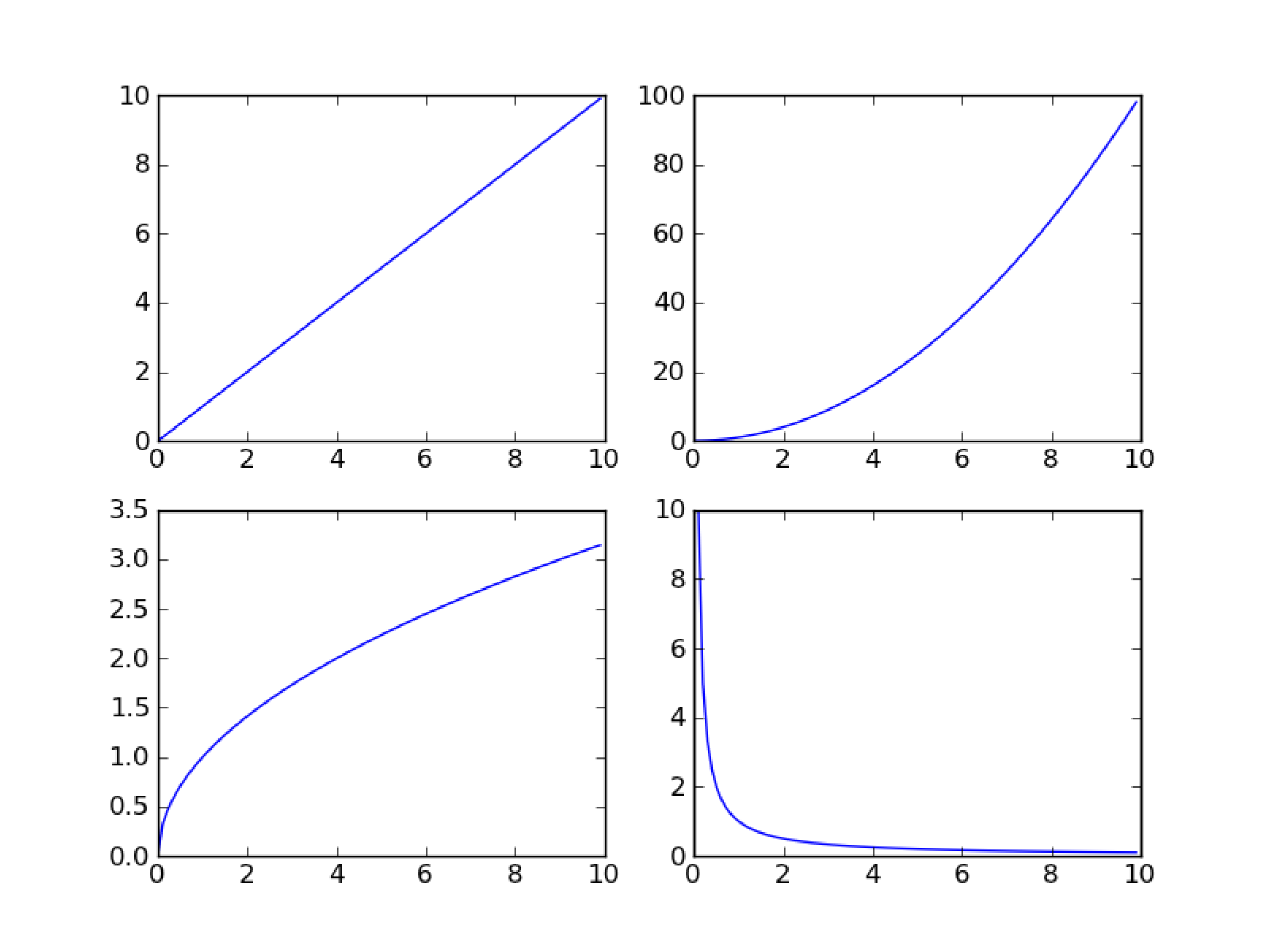
- `ax` is an *r*×*c* NumPy array containing all the individual axes for the subplots.

subplots() Example

```
import matplotlib.pyplot as plt
import numpy as np
x = np.arange(0,10.0, 0.1)
fig, ax = plt.subplots(2,2)
ax[0,0].plot(x, x)
ax[0,1].plot(x, x**2)
ax[1,0].plot(x, np.sqrt(x))
ax[1,1].plot(x, 1/x)
plt.show()
```

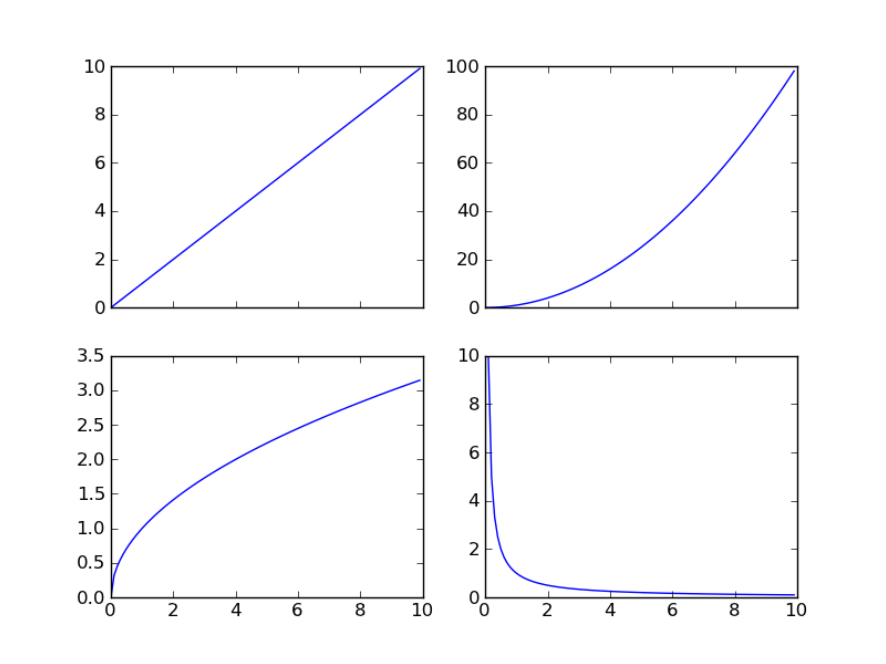
File: subplots-example.py

`subplots()` Result



Sharing Axis Labels

- Using the keywords `sharex` or `sharey` the x or y axes can be shared among subplots
- For example, using `sharex = True` in the previous example yields the plot shown.



Iterating Over Subplots

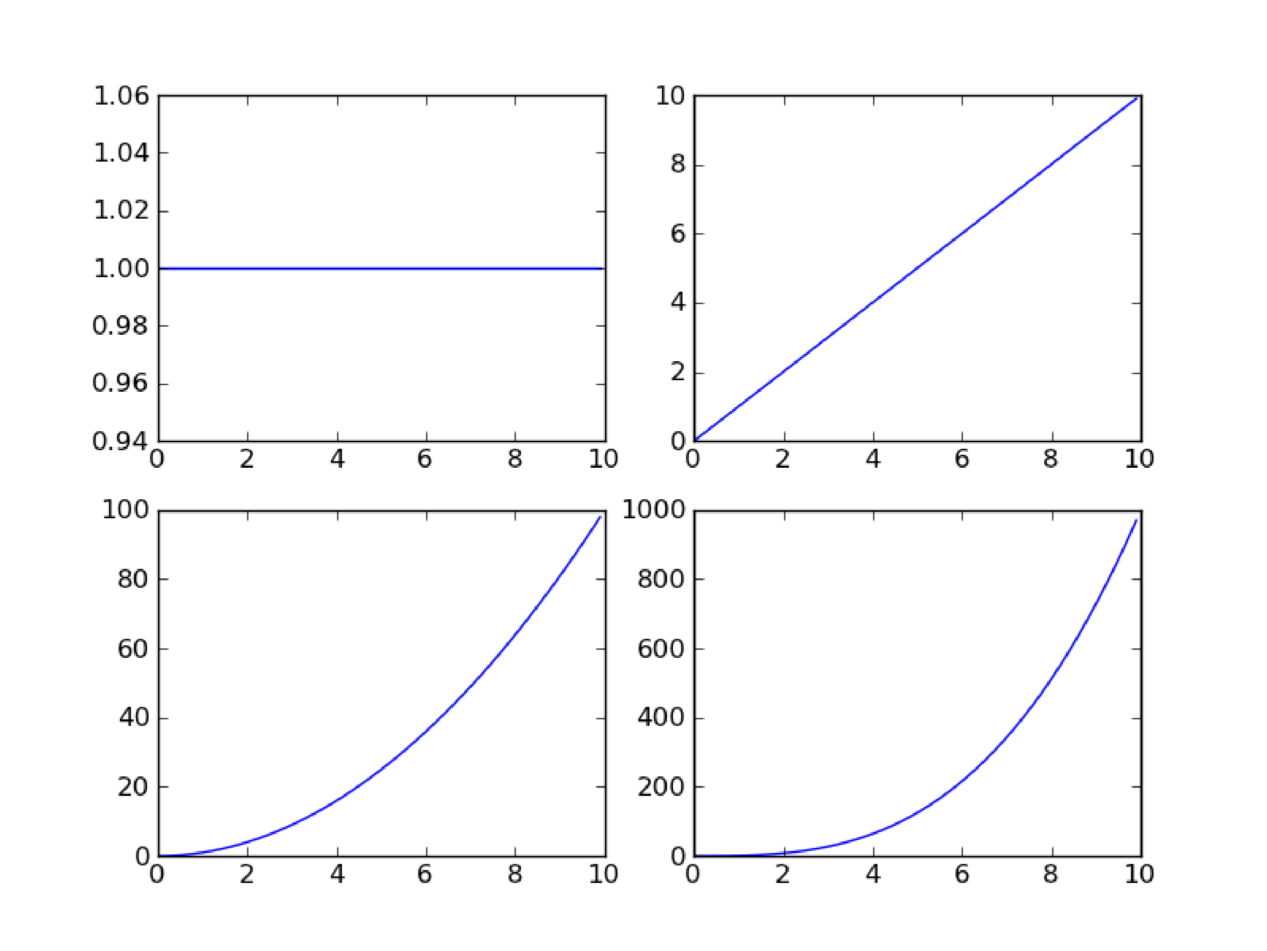
- Since subplots() returns an array containing all the axes, we can iterate over it if we want to.

```
import matplotlib.pyplot as plt
import numpy as np
x = np.arange(0,10.0, 0.1)
fig, ax = plt.subplots(2,2)
for i, a in enumerate(ax.flatten()):
    a.plot(x,x**i)
plt.show()
```

`flatten()` creates 1-D array from multi-dimensional array

File: subplots-iterate.py

`subplots()` Iteration Result


1.06
1.04
1.02
1.00
0.98
0.96
0.94
0
2
4
6
8
10
10
8
6
4
2
0
0
2
4
6
8
10
100
80
60
40
20
0
0
2
4
6
8
10
1000
800
600
400
200
0
0
2
4
6
8
10