

# Plotting Tutorial with matplotlib and Mathematica

Shirong Wang

Department of Chemistry, Fudan University

April 23, 2021

# Overview

1 Introduction

2 matplotlib: A Simple Way

3 matplotlib: A Hard Way

4 Mathematica

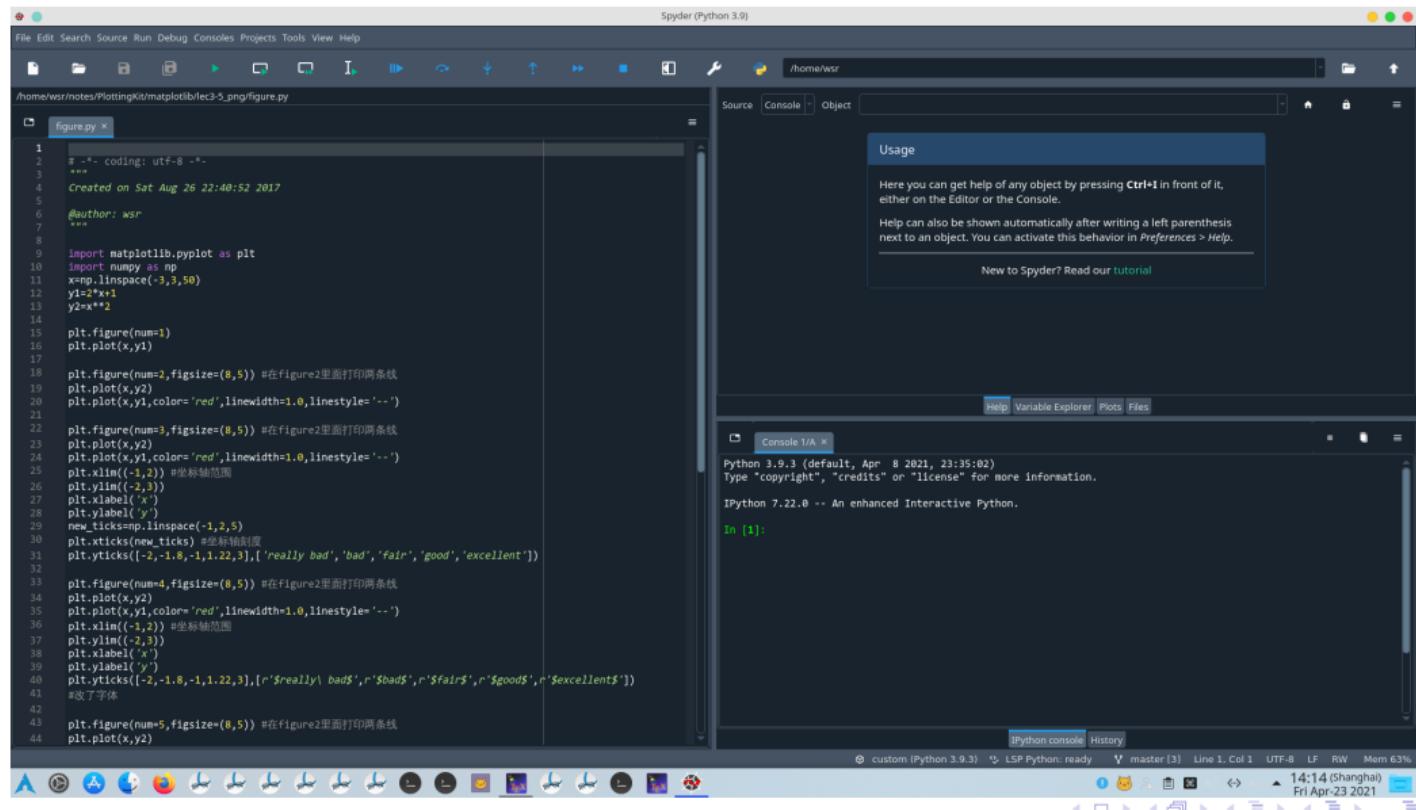
# Why matplotlib

- Free and open source
- General and flexible
- Data execution with python

## Installation:

- Anaconda for Linux/MacOS/Windows, latest version 2020.11  
[www.anaconda.com/products/individual](http://www.anaconda.com/products/individual)  
[mirrors.nju.edu.cn/anaconda/archive](http://mirrors.nju.edu.cn/anaconda/archive)
- pip, apt, pacman, ...
- IDE: Spyder, VS Code, ...

# Get Started with IDE



The screenshot shows the Spyder IDE interface with a Python script named `figure.py` open in the Editor tab. The code generates five separate plots (Figure 1 through Figure 5) using matplotlib. The plots show various line styles and colors, with some including labels and ticks. The IDE features a toolbar at the top, a navigation bar, and several tabs (Source, Console, Object) on the right. A tooltip provides information about the 'Usage' of objects. The Console tab shows the Python environment and the IPython console output, which includes copyright information and the current date and time (April 23, 2021). The bottom status bar displays file paths, line numbers, and memory usage.

```

1  # -*- coding: utf-8 -*-
2  """
3      Created on Sat Aug 26 22:40:52 2017
4      @author: wsr
5      """
6
7
8  import matplotlib.pyplot as plt
9  import numpy as np
10 x=np.linspace(-3,3,50)
11 y1=x**1
12 y2=x**2
13
14 plt.figure(num=1)
15 plt.plot(x,y1)
16
17 plt.figure(num=2,figsize=(8,5)) #在Figure2里面打印两条线
18 plt.plot(x,y2)
19 plt.plot(x,y1,color='red',linewidth=1.0,linestyle='--')
20
21 plt.figure(num=3,figsize=(8,5)) #在Figure2里面打印两条线
22 plt.plot(x,y2)
23 plt.plot(x,y1,color='red',linewidth=1.0,linestyle='--')
24 plt.xlim((-1,2)) #坐标轴范围
25 plt.ylim((-2,3))
26 plt.xlabel('x')
27 plt.ylabel('y')
28 new_ticks=np.linspace(-1,2,5)
29 plt.xticks(new_ticks) #坐标轴刻度
30 plt.yticks([-2,-1.8,-1,1.2,3],[r'really bad',r'bad',r'fair',r'good',r'excellent'])
31
32
33 plt.figure(num=4,figsize=(8,5)) #在Figure2里面打印两条线
34 plt.plot(x,y2)
35 plt.plot(x,y1,color='red',linewidth=1.0,linestyle='--')
36 plt.xlim((-1,2)) #坐标轴范围
37 plt.ylim((-2,3))
38 plt.xlabel('x')
39 plt.ylabel('y')
40 plt.yticks([-2,-1.8,-1,1.2,3],[r'really bad',r'bad',r'fair',r'good',r'excellent'])
41 #改了字体
42
43 plt.figure(num=5,figsize=(8,5)) #在Figure2里面打印两条线
44 plt.plot(x,y2)

```

# Get Started with IDE

Spyder (Python 3.9)

/home/wsr/note/PlottingKit/matplotlib/Lec3\_5.png/figure.py

figure.py

```

1  # -*- coding: utf-8 -*-
2  """
3  Created on Sat Aug 26 22:40:52 2017
4  @author: wsr
5  """
6
7
8  import matplotlib.pyplot as plt
9  import numpy as np
10 x=np.linspace(-3,3,50)
11 y1=x*x+1
12 y2=x*x*2
13
14 plt.figure(num=1)
15 plt.plot(x,y1)
16 [
17
18 plt.figure(num=2,figsize=(8,5)) #在Figure2里面打印两条线
19 plt.plot(x,y2)
20 plt.plot(x,y1,color='red',linewidth=1.0,linestyle='--')
21
22 plt.figure(num=3,figsize=(8,5)) #在Figure2里面打印两条线
23 plt.plot(x,y2)
24 plt.plot(x,y1,color='red',linewidth=1.0,linestyle='--')
25 plt.xlim((-1,2)) #坐标轴范围
26 plt.ylim((-2,3))
27 plt.xlabel('x')
28 plt.ylabel('y')
29 new_ticks=np.linspace(-1,2,5)
30 plt.xticks(new_ticks) #坐标轴刻度
31 plt.yticks([-2,-1.8,-1.1,2,3],['really bad','bad','fair','good','excellent'])
32
33 plt.figure(num=4,figsize=(8,5)) #在Figure2里面打印两条线
34 plt.plot(x,y2)
35 plt.plot(x,y1,color='red',linewidth=1.0,linestyle='--')
36 plt.xlim((-1,2)) #坐标轴范围
37 plt.ylim((-2,3))
38 plt.xlabel('x')
39 plt.ylabel('y')
40 plt.yticks([-2,-1.8,-1.1,2,3],['really bad','bad','fair','good','excellent'])
41 #改了字体
42
43 plt.figure(num=5,figsize=(8,5)) #在Figure2里面打印两条线
44 plt.plot(x,y2)

```

