Software Installation

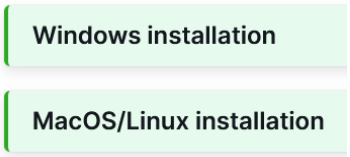
1. Introduction to Jupyter Notebook

1.1 Anaconda

Anaconda is an open-source distribution of the Python and R programming languages for scientific computing. It is an all-in-one bundle containing not only Python, but also many libraries. It aims to simplify package management and deployment.

1.2 How to install **Anaconda Individual Edition**

Refer to https://docs.anaconda.com/anaconda/install/, as shown below, according to your operating system, click the link to complete the installation of Anaconda.



After the installation, some of installed software used for our class are

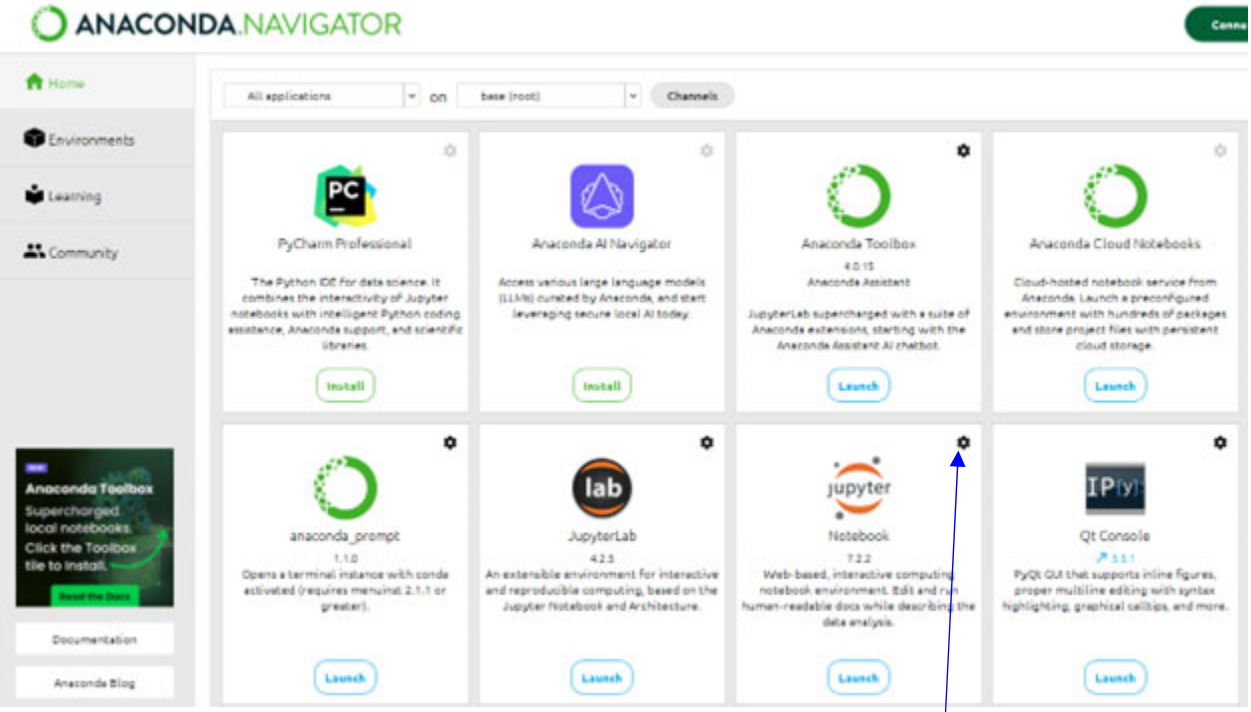
- **Anaconda** - a platform with many libraries for Python and R development
- **Anaconda Navigator** - a desktop GUI makes it easy to launch different applications and manage packages and environments without using command-line commands.
- **Python** 3.12.x (as of Nov. 2024)
- **Jupyter Notebook** - an interactive development environment (IDE) for IPython (interactive Python) to write programs and display images, and it runs in a web browser (Internet connection is not required). It combines software code, computational output, explanatory text, and multimedia resources.
- **NumPy** – (Numerical Python) is a python library used for working with arrays and provides a large collection of high-level mathematical functions to operate on these arrays. It is faster than the Python's list.
- **Pandas** – is a library for data manipulation and analysis. In particular, it offers data structures and operations for manipulating numerical tables and time series.
- **Matplotlib** – is a comprehensive library for creating static, animated, and interactive visualizations in Python.

Exercise 1:
Install Anaconda Individual Edition in your computer.

2. Anaconda Navigator

Anaconda Navigator is a graphical interface that makes it very easy to manage Python environments and launch Python applications. To lunch Anaconda Navigator, in a Windows computer, click Start on left corner of the screen, click Anaconda Navigator. For easy access, you can either pin it to taskbar or create a shortcut on your desktop.

After Anaconda Navigator starts, it looks like the following.



3. Jupyter Notebook

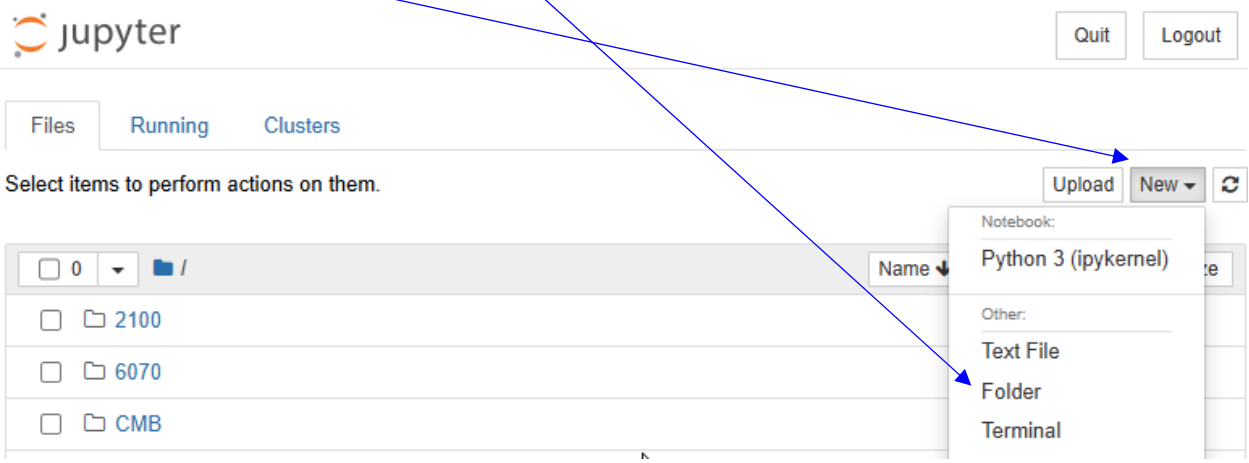
After Anaconda Navigator is displayed, for Jupyter Notebook click the gear icon, click "Install specific version", choose the **version 6.5.7** (because version 7+ has problems with visulization). After the installation of version 6.5.7 is completed, click Lunch to start Jupyter Notebook.

Exercise 2:

Install Jupyter Notebook version 6.5.7.

3.1 Demonstration of Jupyter Notebook

1) If you haven't started Jupyter Notebook, start it as described in the above step 2.
2) Click **New** dropbox and click **Folder**, enter 6070 and press ENTER key. A folder named 6070 will be created. Click **Last Modified** column to sort folders by last time modified.

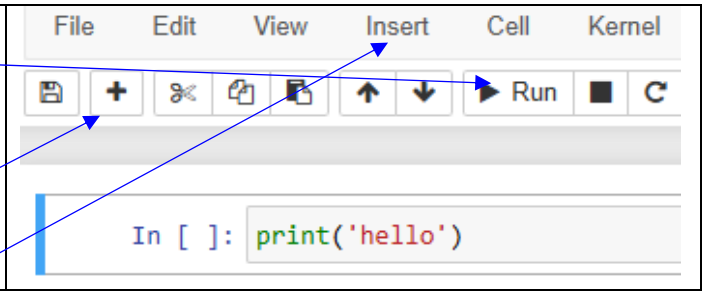


3) Double click the 6070 folder to move into this folder. You may create more subfolders under 6070 if you want.
4) Under 6070 folder, create a new Python file by the following steps:
Click **New** dropdown box again and click **Python 3** menu item.
5) In a new web browser tab, in a code cell like the following, enter this statement.

```
print('hello')
```

- In this print statement, the pair of parentheses indicate that *print* is a function.
- The quotation marks mark the beginning and end of the text to be printed; the quotation marks don't appear in the output result.

6) To run code in the code cell:
a) Click the **Run** button on top, or
b) Press ALT and ENTER keys together, or
c) Press SHIFT and ENTER keys together



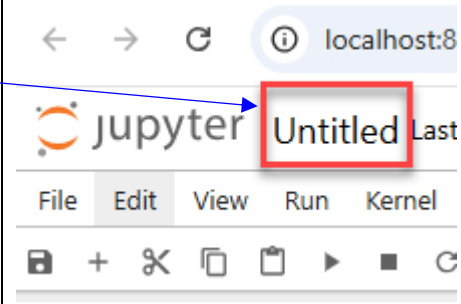
7) To insert a new code cell:
1) click **+ icon** on the menu item, or
2) press ALT and ENTER keys together, or
3) click Insert on menu and choose "Insert Cell Above" or "Insert Cell Below".

8) In the next code cell, enter the following three lines of statements, run the cell and find the result of the statements.

x = 1 y = x + 2 print(y)	**=** is for assignment: assign the value from the right to the veritable on the left **+** is an arithmetic operator for addition

9) To save the file:
1) click the disk icon on the menu, or
2) click **File** on the menu and select **Save and Checkpoint.**

10) To change the file name:

The default file name is Untitled. To change the default file name, click **Untitled** on top of the page, enter a new file name, **test1**, and keep the extension name of ipynb, and click the **rename** button. **ipynb** is the extension name for Jupyter notebook Python programs.	

11) To find the file

in Windows computers, the file may be located under *C:\Users\<username>\6070*

The file name should be test1.ipynb (the extension **ipynb** is for Jupyter Notebook).

12) To create a .py file

Typically a python program has a .py extension. To get a .py file here, click **File** -> **Download as** and select "Python (.py)"**.** Then test1.py is downloaded, check your download folder.

3.2 Tutorial video on Jupyter Notebook
https://www.youtube.com/watch?v=IMrxB8Mq5KU

3.3 Accessing documentation

Python has a built-in help() function that can display help information. For example, to see the documentation of the built-in **len()** function, type the following in a code cell.

```
help(len)
```

blue text is output or comment

```
Help on built-in function len in module builtins:
len(obj, /)
    Return the number of items in a container.
```

4. Download Programs for Textbooks

Book 1 – Think Python

On middle of this page, https://github.com/AllenDowney/ThinkPython2/tree/master, click the green button, Code, then click Download Zip. After download, unzip this file to your computer. After unzip you can copy or move the code subfolder (under ThinkPython2-master) to your 6070 folder and rename the code folder as book1 so that the folder is like C:\Users\<username>\6070\book1.

Book 2 – Python Data Science Handbook

On middle of this page, https://github.com/jakevdp/PythonDataScienceHandbook, click the green button, Code, then click Download Zip. After download, unzip this file. After unzip you can copy or move the notebooks subfolder (under PythonDataScienceHandbook-master) to your 6070 folder and rename the notebooks folder as book2 so that the folder is like C:\Users\<username>\6070\book2.

5. Open a .py file in Jupypter Notebook and run it

Recall, a python file has .py extension, a Jupyter Notebook file's extension is .ipynb. In order to open or load a .py file, in a code cell of Jupypter Notebook, enter the following command.

```
%load filename.py
```

Assume currently you are in 6070\test1.ipynb, the following command open or load 6070\book1\taxform.py.

```
%load book1\breakfast.py
```

Click the **Run** icon to run the .py Python program.

6. Run a.py or a.ipynb file from b.ipynb file without opening the program

%run is to run external code without opening the program.

For example, in Jupypter Notebook, to run a.py or a.ipynb in b.ipynb, enter

```
%run a.py
```

or

```
%run a.ipynb
```

For example, to run 6070\book1\breakfast.py from 6070\test1.ipynb in Jupypter Notebook, enter the following command in test1.ipynb.

```
%run book1\breakfast.py
```