Introduction to Jupyter & Python:

We will need Skimage, numpy, jupyter and other libraries, most of them are included in Anaconda.

Anaconda includes a package manager Conda and hundreds of scientific packages.

Installation:

On Windows: Just install Anaconda.
https://docs.anaconda.com/anaconda/install/windows/

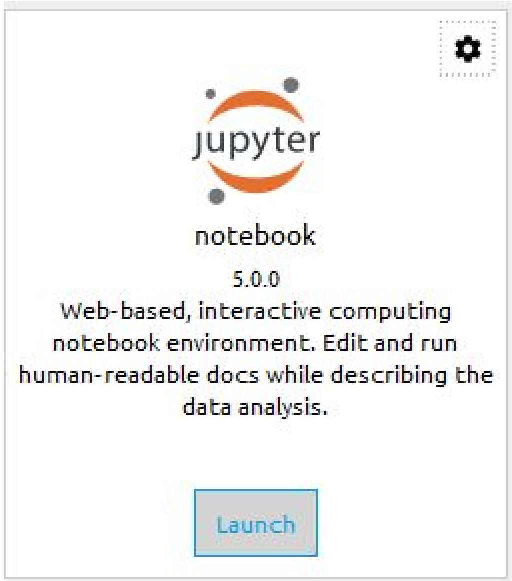
On Linux:
https://docs.anaconda.com/anaconda/install/linux/

Verify installation:
https://docs.anaconda.com/anaconda/install/verify-install/

Attention: Anaconda needs around 3 GB for installation and takes a considerable time to install!

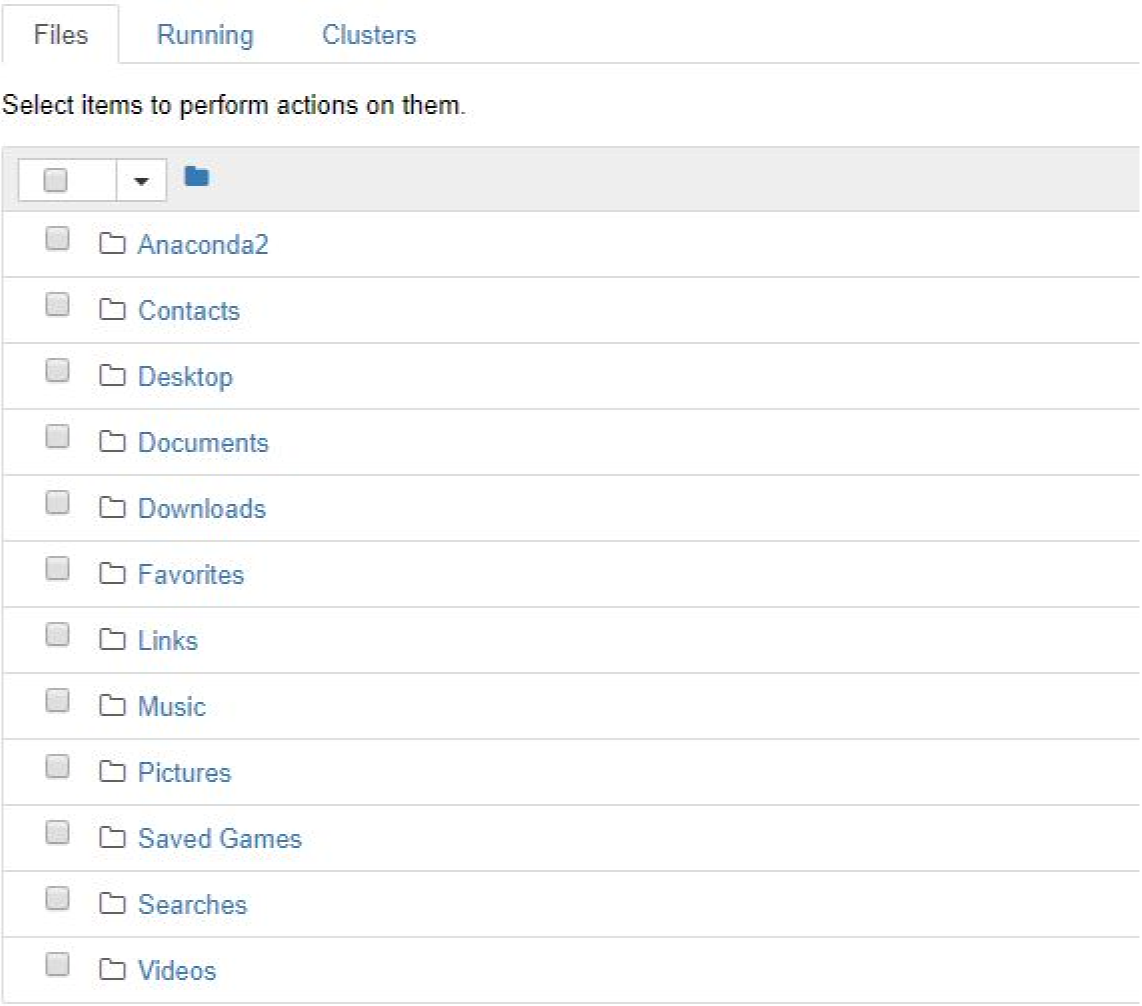
Working with Notebooks:

1- Open Anaconda Navigator
2- Launch Jupyter Notebook



Web-based, interactive computing notebook environment. Edit and run human-readable docs while describing the data analysis.

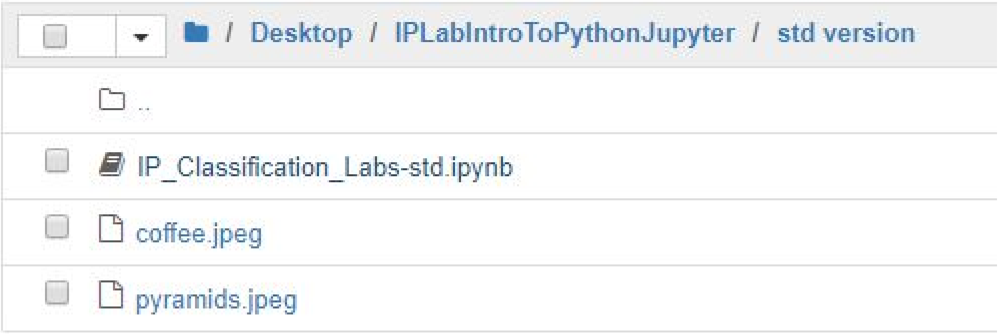
A windows similar to the following will appear:



Select items to perform actions on them.

- □ Anaconda2
- □ Contacts
- □ Desktop
- □ Documents
- □ Downloads
- □ Favorites
- □ Links
- □ Music
- □ Pictures
- □ Saved Games
- □ Searches
- □ Videos

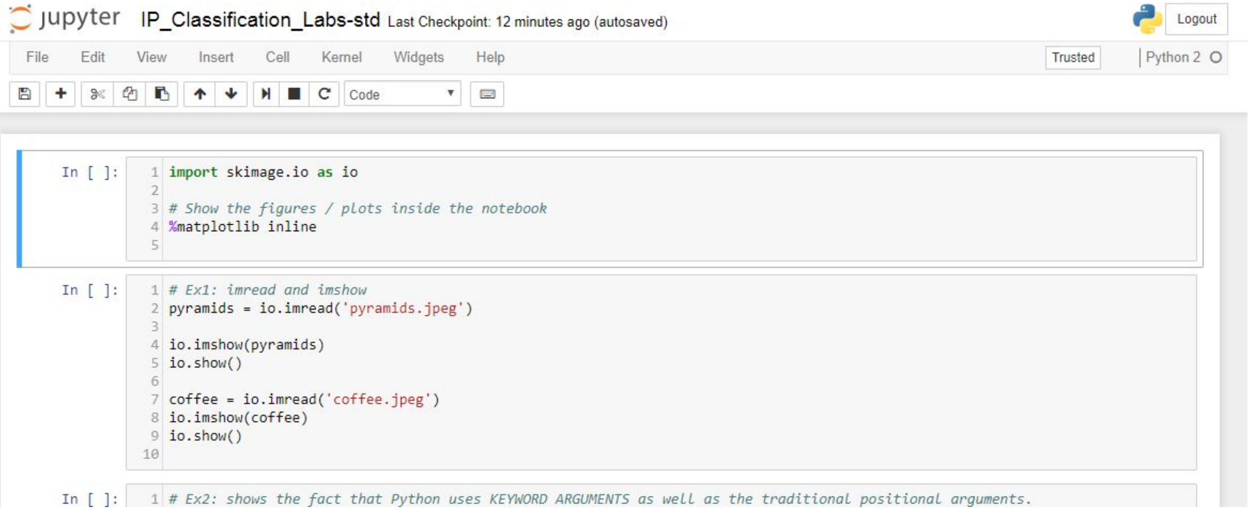
3- Browse to the directory that contains the notebook (click on the name of the directory to open it.



/ Desktop / IPLabIntroToPythonJupyter / std version

- ..
- □ IP_Classification_Labs-std.ipynb
- □ coffee.jpeg
- □ pyramids.jpeg

4- Press on the required notebook, something similar to the following will appear:

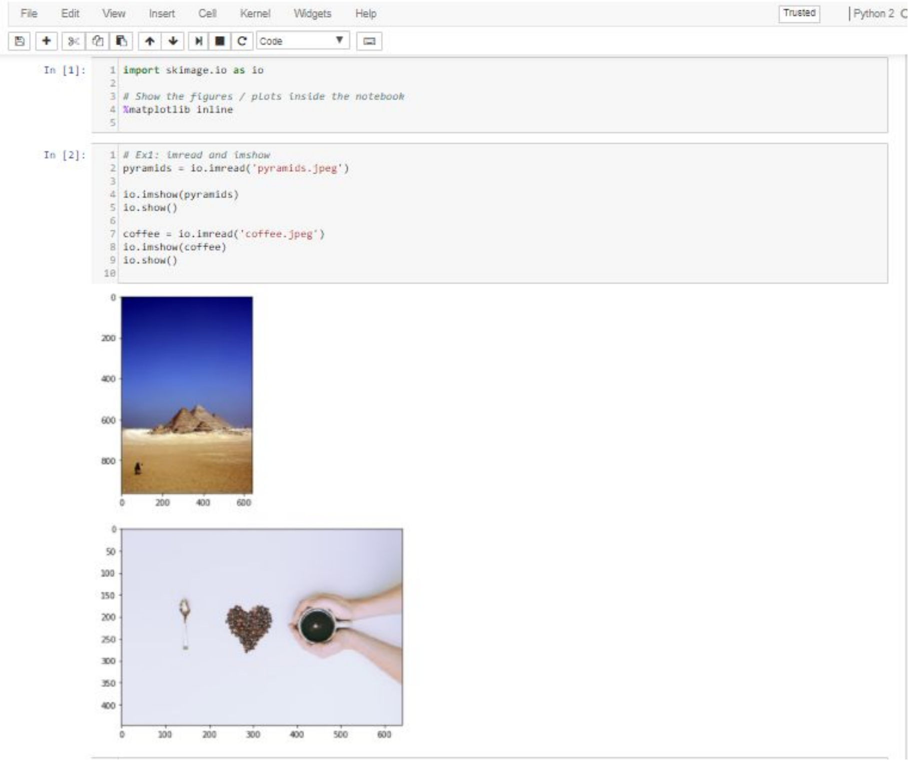


```
In [ ]:  import skimage.io as io

         # Show the figures / plots inside the notebook
         %matplotlib inline

In [ ]:  # Ex1: imread and imshow
         pyramids = io.imread('pyramids.jpeg')

         io.imshow(pyramids)
         io.show()

         coffee = io.imread('coffee.jpeg')
         io.imshow(coffee)
         io.show()

In [ ]:  # Ex2: shows the fact that Python uses KEYWORD ARGUMENTS as well as the traditional positional arguments.
```

To execute any cell click inside the cell and then press the button (⏭). Each part grey level part is called cell and can be executed separately.

<u>Testing on our notebook -required before lab time:</u>

Execute the first 3 cells. The output should be as follows:



```
In [1]:  import skimage.io as io

         # Show the figures / plots inside the notebook
         %matplotlib inline

In [2]:  # Ex1: imread and imshow
         pyramids = io.imread('pyramids.jpeg')

         io.imshow(pyramids)
         io.show()

         coffee = io.imread('coffee.jpeg')
         io.imshow(coffee)
         io.show()
```

Intro To Python

To open jupyter notebook use Anaconda Navigator (installed with anaconda) and Press Launch on Jupyter.

Functions in python

One of the great features of Python is the ability to use KEYWORD ARGUMENTS as well as the traditional positional arguments.
For example:
The function:

```
def fun(x,y,z):
   print x,y,z
```

Can be called as:

```
fun(1,2,3); #Or
fun(z=3,y=2,x=1)
```

In both cases the output will be: 1 2 3
See Example 2 in the notebook

Reading and showing images

```
import skimage.io as io
# to read image;
Img = io.imread('image.png')
# To show image
io.imshow(img)
io.show()
```

Dealing with arrays

Numpy is a great mathematical library that deals with array.
To construct array of zeros [5,5,5] all of unit8 (range from 0 to 255)

```
Import numpy as np
```

```
Arr = np.zeros(shape=(5,5,5),dtype=np.uint8)
```

Array Indexing

Arrays can be indexed in a way similar to matlab, with two differences:
It uses square brackets and index starts with 0.

```
Arr[0:50,0:50,1] = 20
```

Will change the set of intersection of the first 50 rows and first 50 columns in the first column to 20.

np.copy

Is used to construct a copy of the sent array (matrix) and returns it.

```
copiedArr = np.copy(Arr)
```

Requirements

Open attached notebooks to find requirements’ details and hints

General Hints:
Filters References:
https://scikit-image.org/docs/dev/api/skimage.filters.html
ImNoise:
http://scikit-image.org/docs/dev/api/skimage.util.html

Features (including Canny):
http://scikit-image.org/docs/dev/api/skimage.feature.html

Equalize_hist:
http://scikit-image.org/docs/dev/api/skimage.exposure.html#skimage.exposure.equalize_hist