e-Yantra Robotics Competition (eYRC 2019-20)

Task 0.1 - Supply Bot

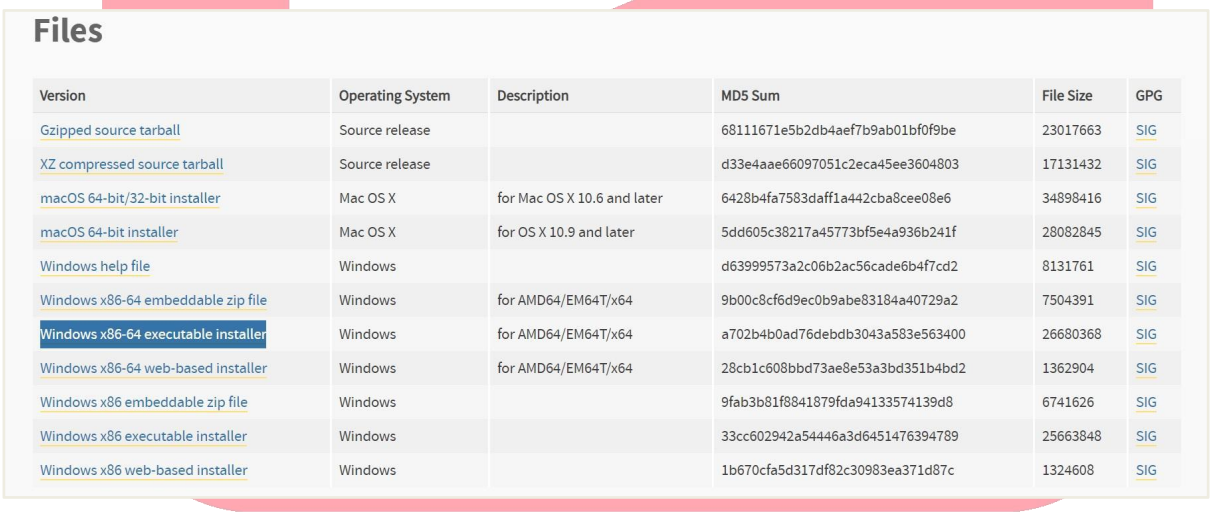
Introduction

In order to perform tasks in eYRC 2019-20, you are required to install certain software on your Windows 64-bit OS system (laptop or computer). Below listed are the installation steps, Dos and Don'ts of the process. Links to software installation, tutorials of programming syntaxes and constructs are given in the **"Tutorials"** folder in the *"References.pdf"* file.

You are expected to read the document carefully and completely first before diving into the installation process!

Python Installation

1. Visit the link: https://www.python.org/downloads/windows/.
   Click on the link "Latest Python 3 Release - Python3.7.4". This will redirect you to the download page for the required Python3.7 version, i.e. the following link: https://www.python.org/downloads/release/python-374/.
   Scroll down to the bottom of the page and you will see many files listed in the *"Files"* section. Click the *"Windows x86-64 executable installer"* file as highlighted in the figure below and it will start downloading on your 64-bit Windows system (Laptop/Computer).

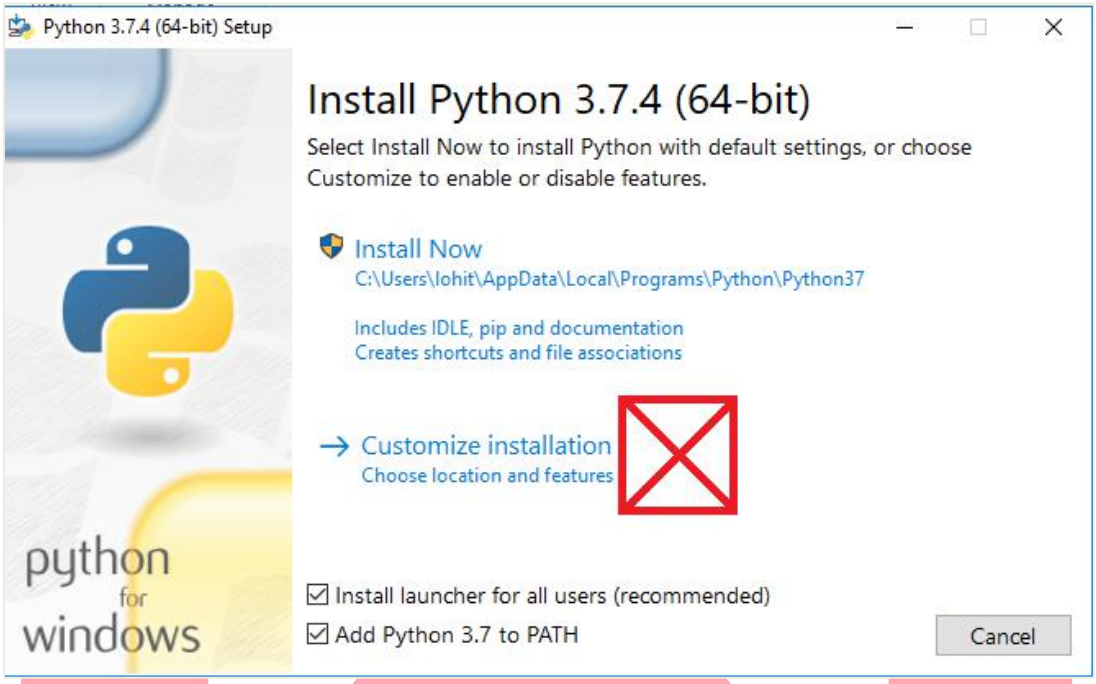


Files

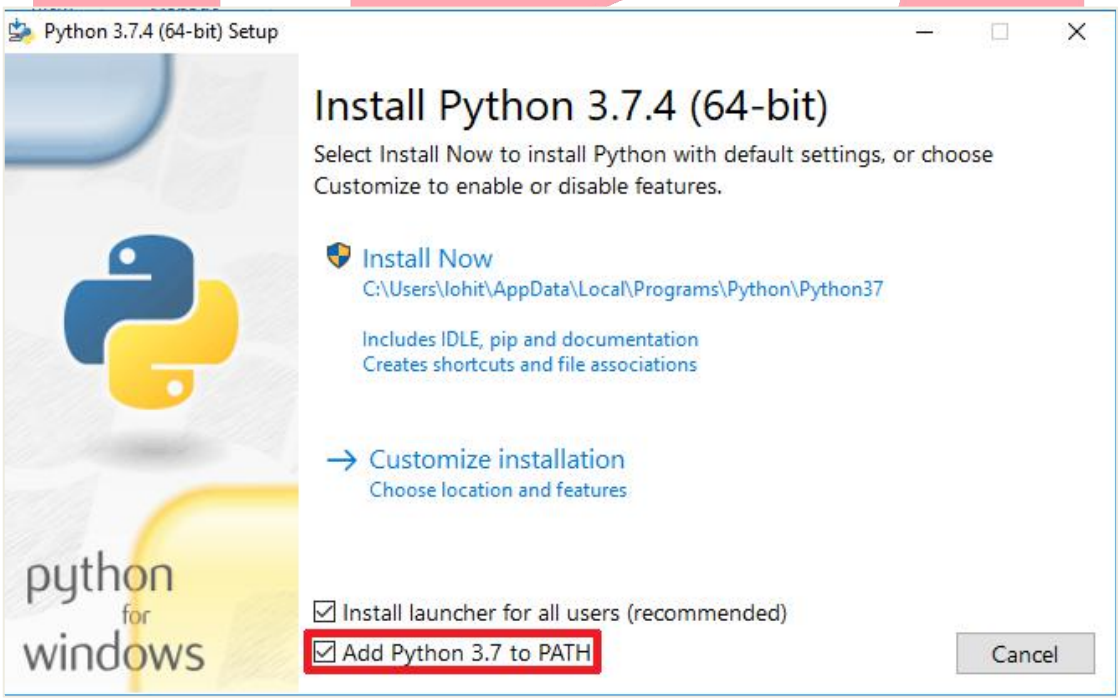
Version	Operating System	Description	MD5 Sum	File Size	GPG
Gzipped source tarball	Source release		68111671e5b2db4aef7b9ab01bf0f9be	23017663	SIG
XZ compressed source tarball	Source release		d33e4aae66097051c2eca45ee3604803	17131432	SIG
macOS 64-bit/32-bit installer	Mac OS X	for Mac OS X 10.6 and later	6428b4fa7583daff1a442cba8cee08e6	34898416	SIG
macOS 64-bit installer	Mac OS X	for OS X 10.9 and later	5dd605c38217a45773bf5e4a936b241f	28082845	SIG
Windows help file	Windows		d63999573a2c06b2ac56cade6b4f7cd2	8131761	SIG
Windows x86-64 embeddable zip file	Windows	for AMD64/EM64T/x64	9b00c8cf6d9ec0b9abe83184a40729a2	7504391	SIG
Windows x86-64 executable installer	Windows	for AMD64/EM64T/x64	a702b4b0ad76debdb3043a583e563400	26680368	SIG
Windows x86-64 web-based installer	Windows	for AMD64/EM64T/x64	28cb1c608bbd73ae8e53a3bd351b4bd2	1362904	SIG
Windows x86 embeddable zip file	Windows		9fab3b81f8841879fda94133574139d8	6741626	SIG
Windows x86 executable installer	Windows		33cc602942a54446a3d6451476394789	25663848	SIG
Windows x86 web-based installer	Windows		1b670cfa5d317df82c30983ea371d87c	1324608	SIG

2. Once the download is complete, double click on the downloaded *".exe"* file i.e. *"python-3.7.4-amd64.exe"*. This will start installing Python on your system.

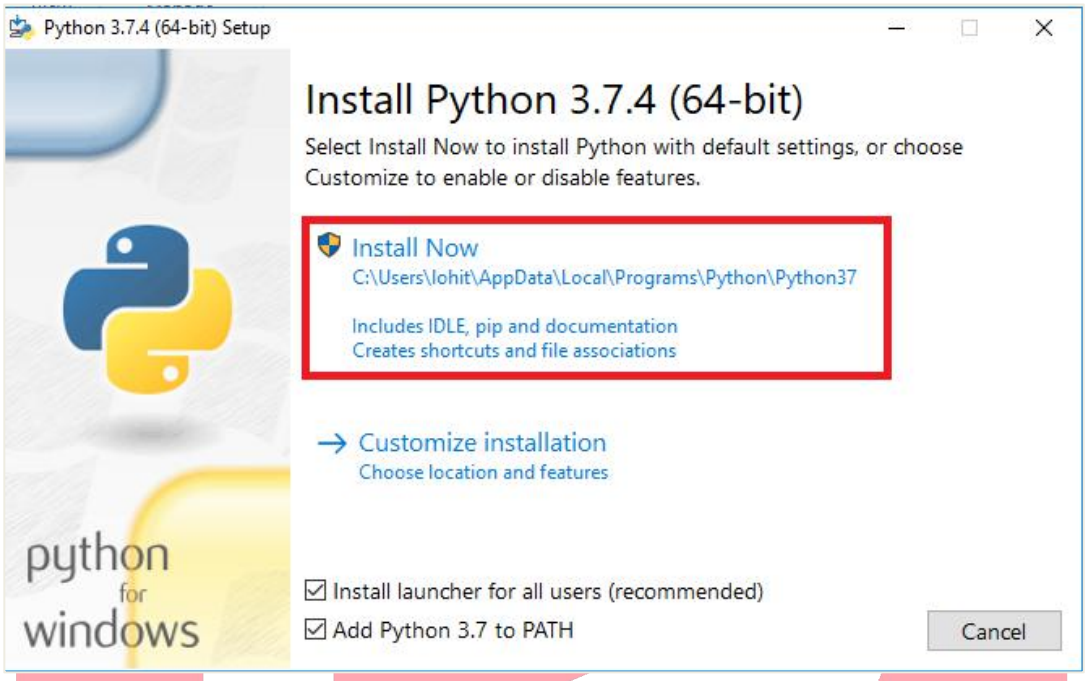
3. During installation of Python the following steps will occur:
   a. The installation screen will ask you if you want regular or custom installation. Do not customize and hence do **NOT** select "Custom Install" as indicated in the figure below. This will thus install regular or default installation.



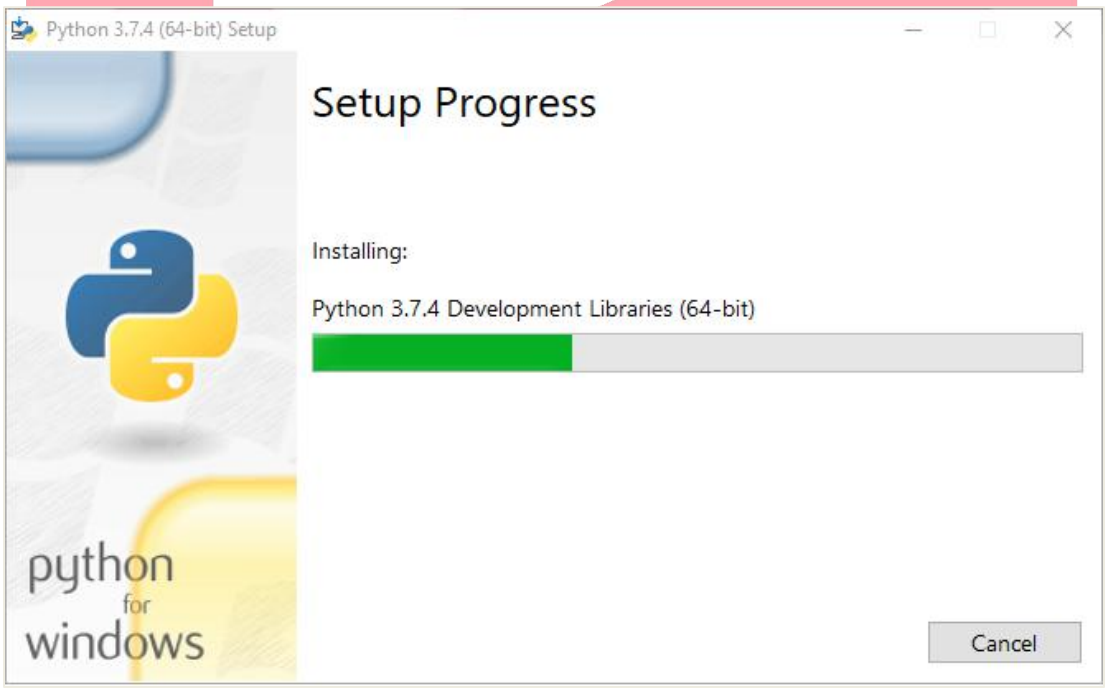
b. Before clicking *"Install Now"*, Click on *"Add Python3.7 to PATH"* in order to add Python's installed path to environment variables as highlighted in the figure below.



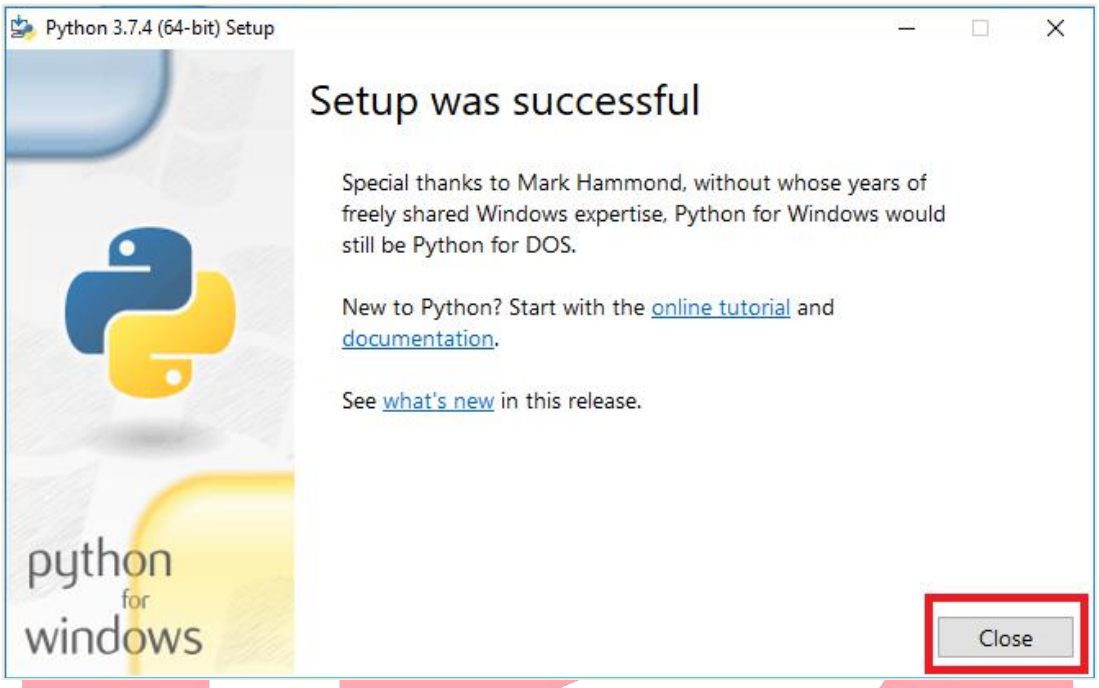
c. Now click *"Install Now"*, highlighted in blue, link encircled in orange as in the figure below. This will start the installation of Python on your system. You might be asked for administrator permissions to install the same, select *"Yes"* in that case.



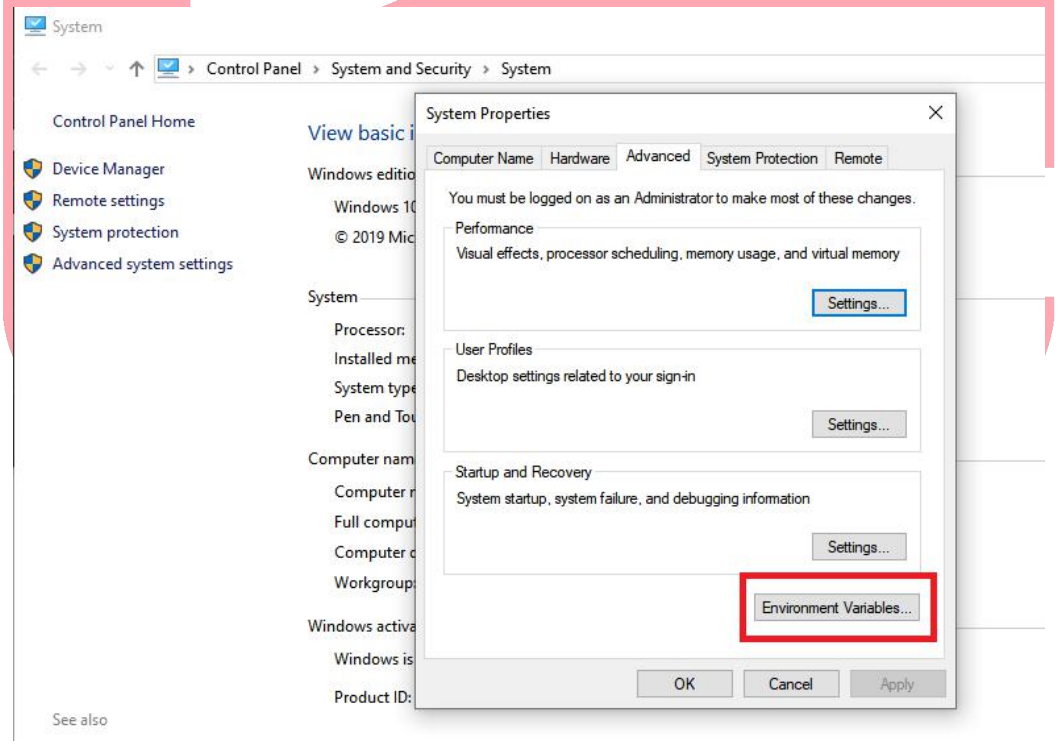
d. While installing a green progress bar will highlight the progress of the installation as shown in the figure below.



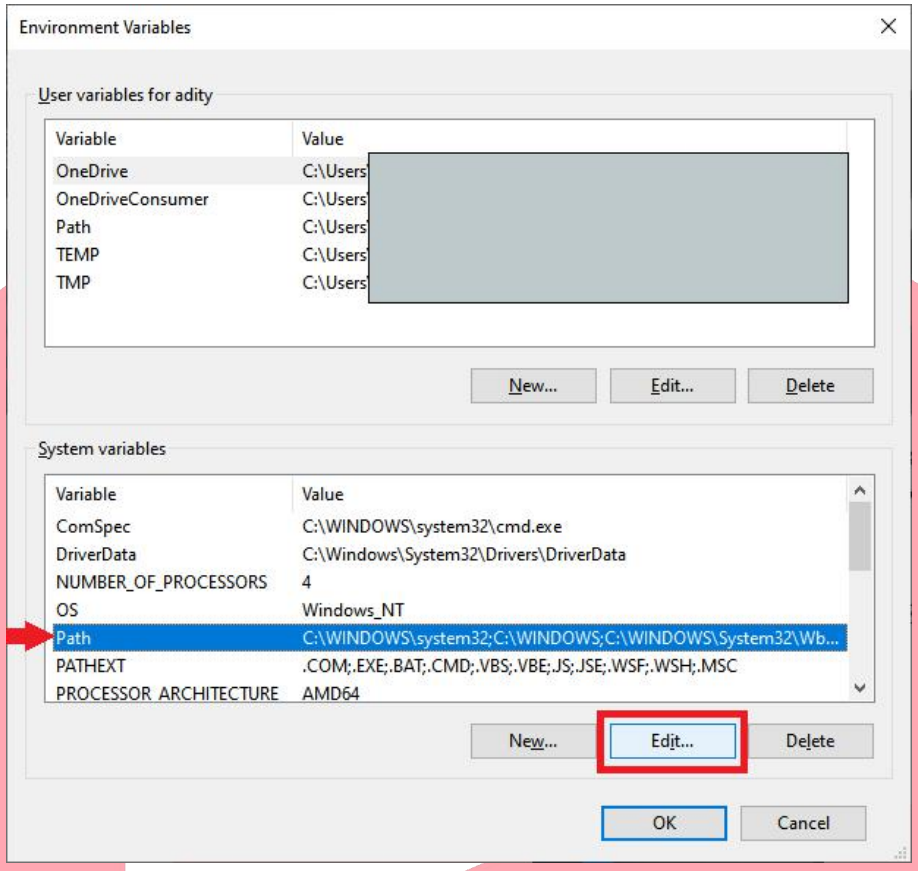
e. Once complete, a screen stating the setup was successful will appear with a *"Close"* button. Click on *"Close"* to end the installation as highlighted in the figure below. Now, you are all set using Python at the command prompt.



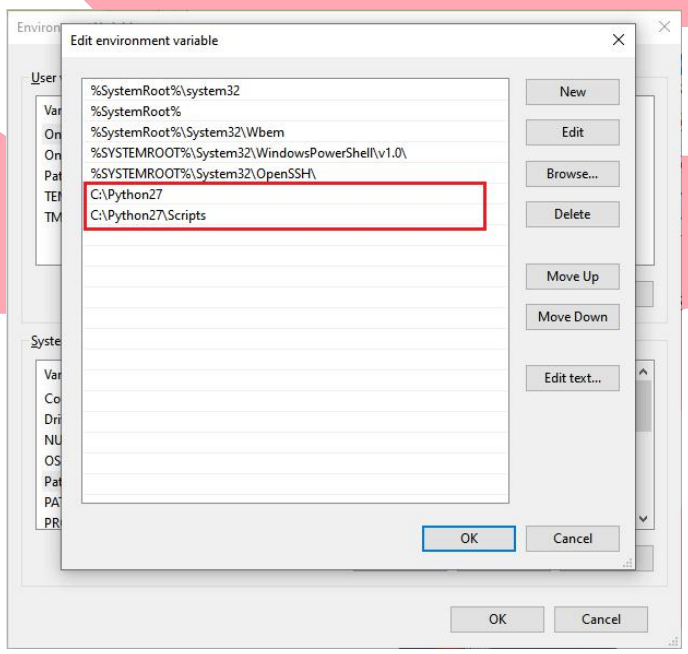
4. Before we move forward let's make sure that we are working **only** with Python 3.7 and no other version (as your system might have previous version(s) of Python already installed),
   a. Navigate to *Environment Variables* option on the *System Properties*, and click on the button as shown in the figure below:



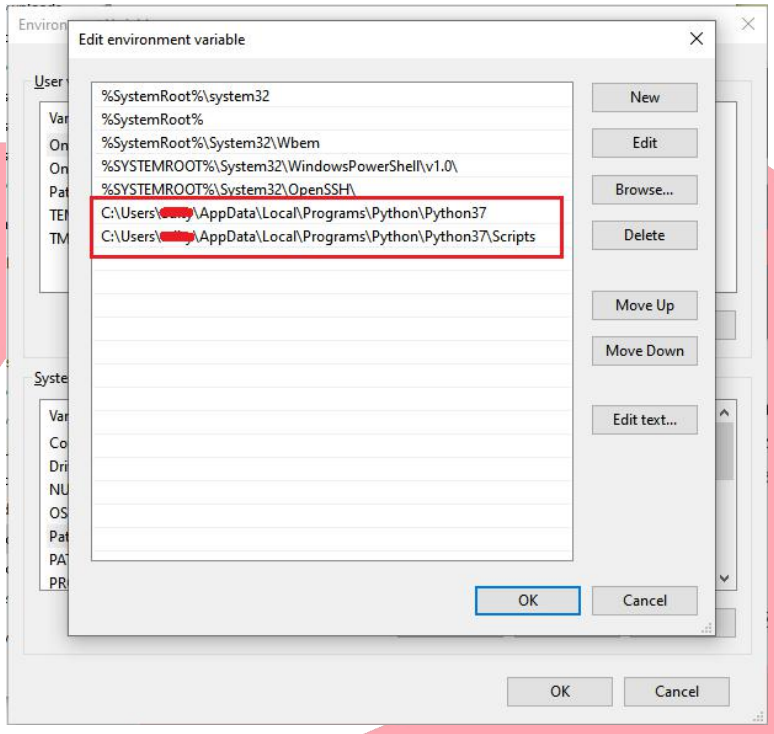
b. Select "**Path**" variable from the "System Variables" block in the Environment Variables window, and click on the edit button, as shown below:



c. In the "Edit environment variable" window we will require all the current versions of the installed Python 3.7 on the system, we will change the paths to our required Python version. In the figure below, we have Python 2.7 (older version) already running on the system

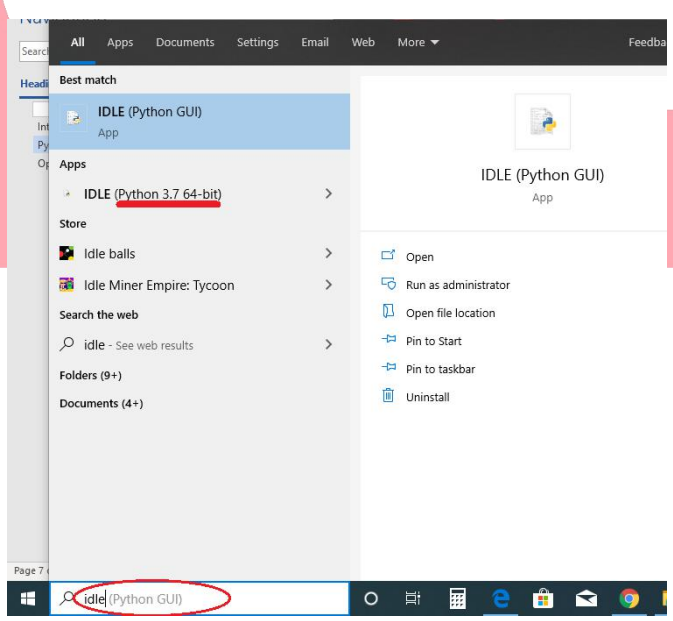


d. On successful installation of Python 3.7, we should see "python37" folder in path *"C:\Users\xyz\AppData\Local\Programs\Python"* and "Scripts" folder in path *"C:\Users\xyz\AppData\Local\Programs\Python\Python37"*. We need to delete the previous version paths and replace them with the current version paths, as shown below:

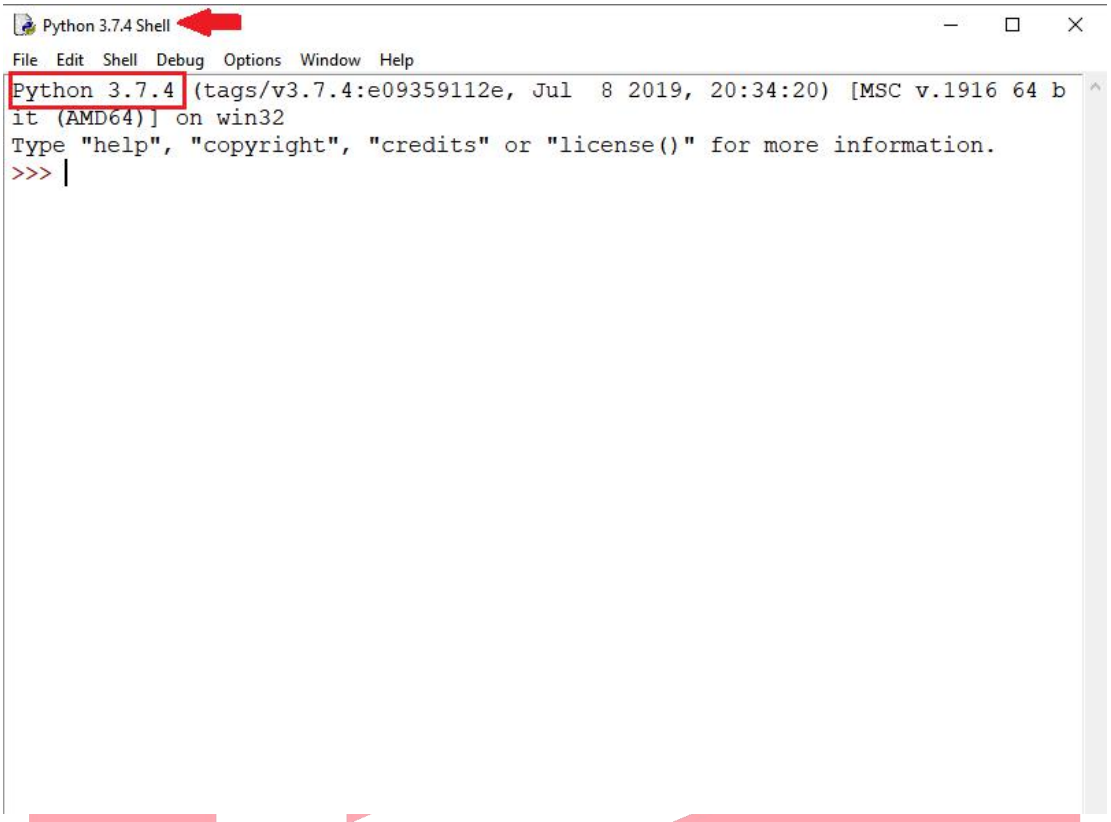


e. To save our Environmental Variables, Click "OK" button on each window until the Environment Variables window closes.

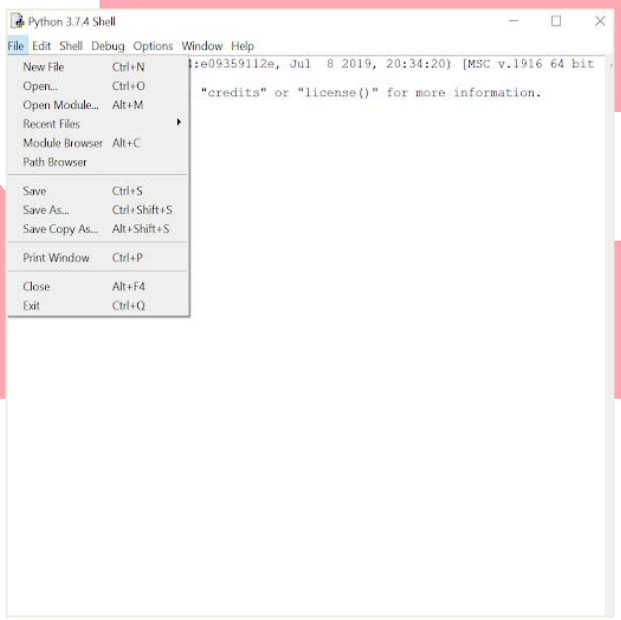
5. In order to edit the Python script via normal text, use IDLE which is installed along with Python install. This will show as *"IDLE (Python 3.7 64-bit)"* application in search as shown in the figure below, make sure you select "***IDLE (Python 3.7 64-bit)***".



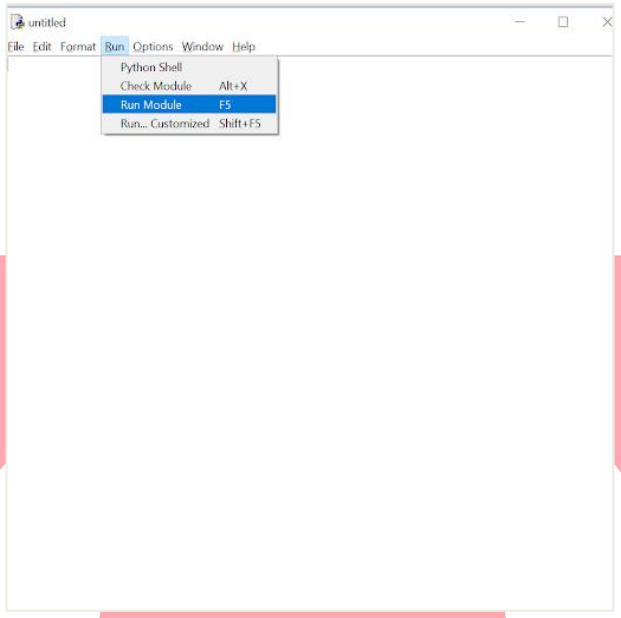
6. The scripting environment of python in IDLE will look like the figure shown below.



7. In order to write scripts, you want to code in IDLE, click on *"File → New File"* or press the *"Ctrl + N"* keys on the keyboard together as shown in the figure below. This will open a script document for you in which you can type your code.



8. To execute or run your code from IDLE click in *"Run → Run Module"* or press the *F5* key on the keyboard as shown in the figure below.

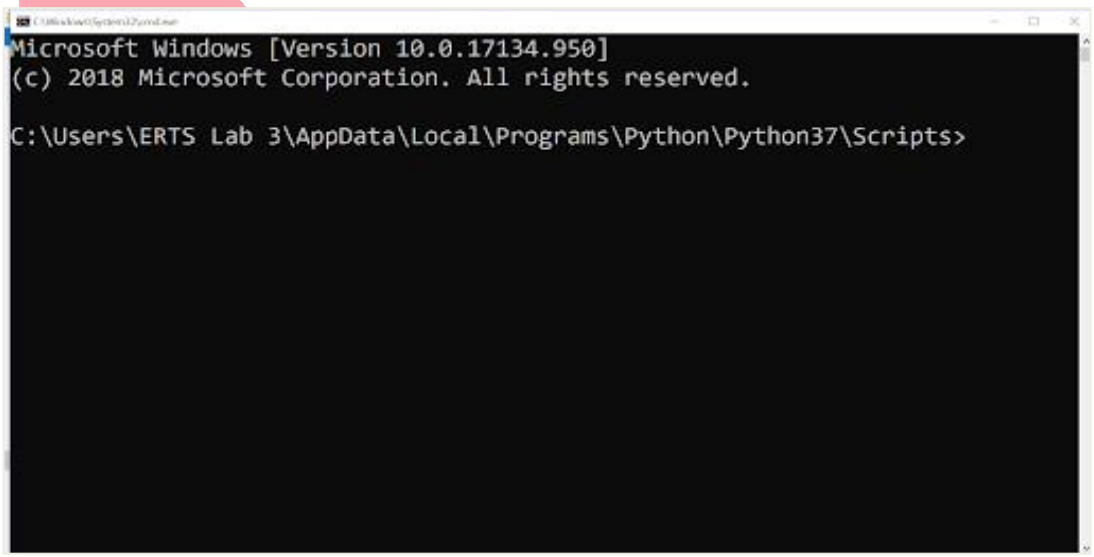


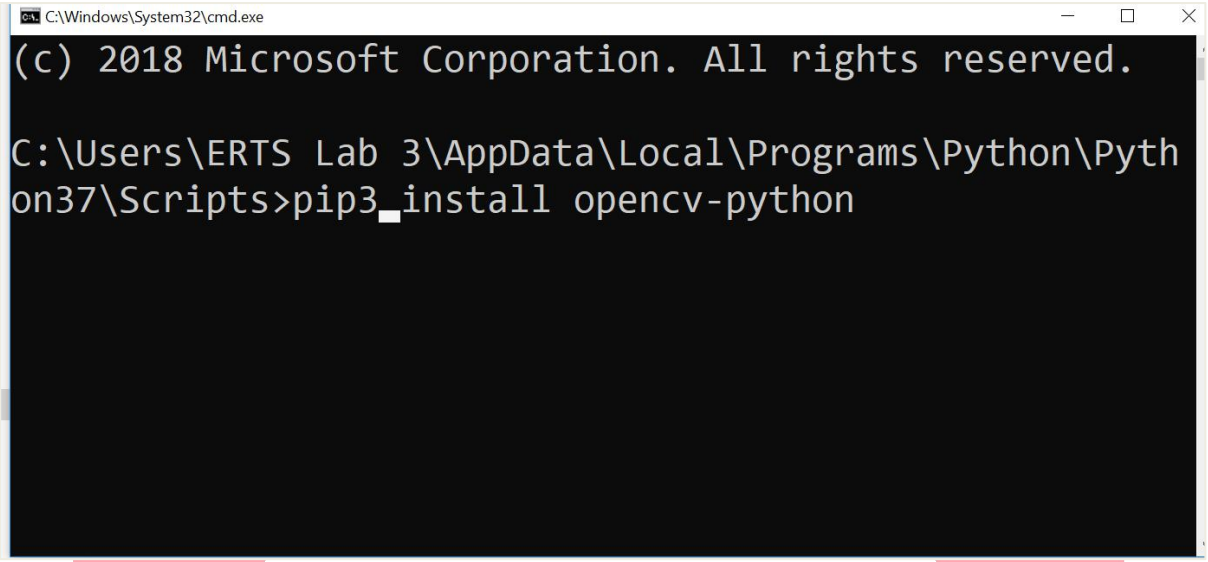
OpenCV Installation

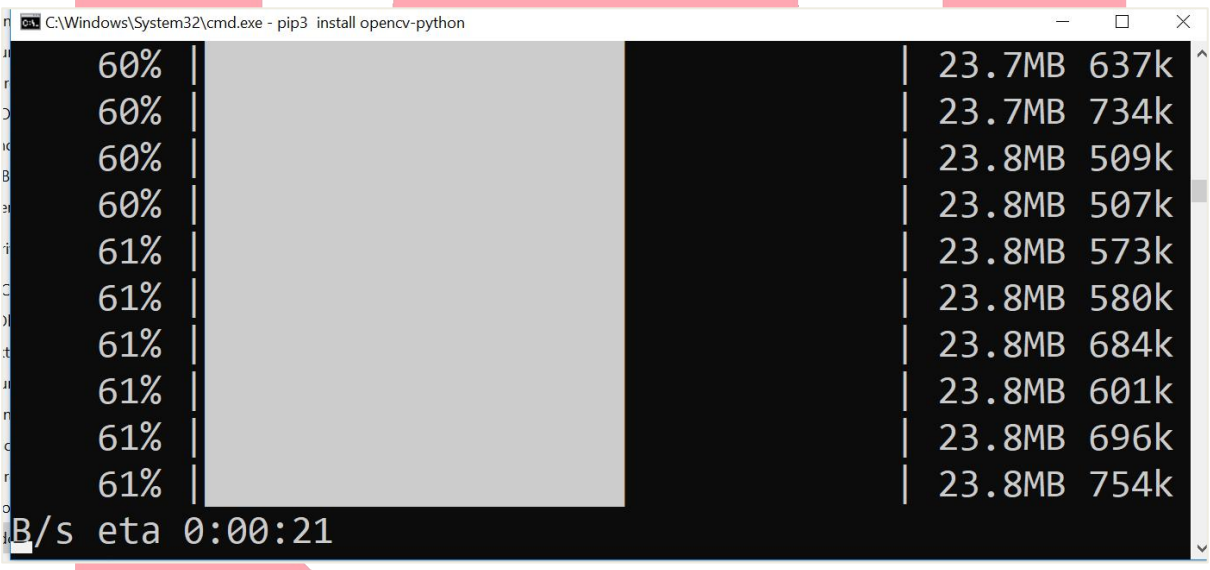
1. Go to the directory in your system where you have the folder for the installed Python version e.g. *"C:\Users\Admin\AppData\Local\Programs\Python\Python37"*. Within this folder go to the *"Scripts"* folder where *"pip.exe"* and *"pip3.exe"* files are there.
2. Within this folder start the command prompt by typing *"cmd"* in the address bar of the folder viewer. Once the command window is up as shown in the figure below, at the prompt type the following command.

   pip3 install opencv-python

   This will start installing python version of opencv on your system and the progress can be seen by a white progress bar increasing from left to right between two pipes | -> | as shown in the figures below.



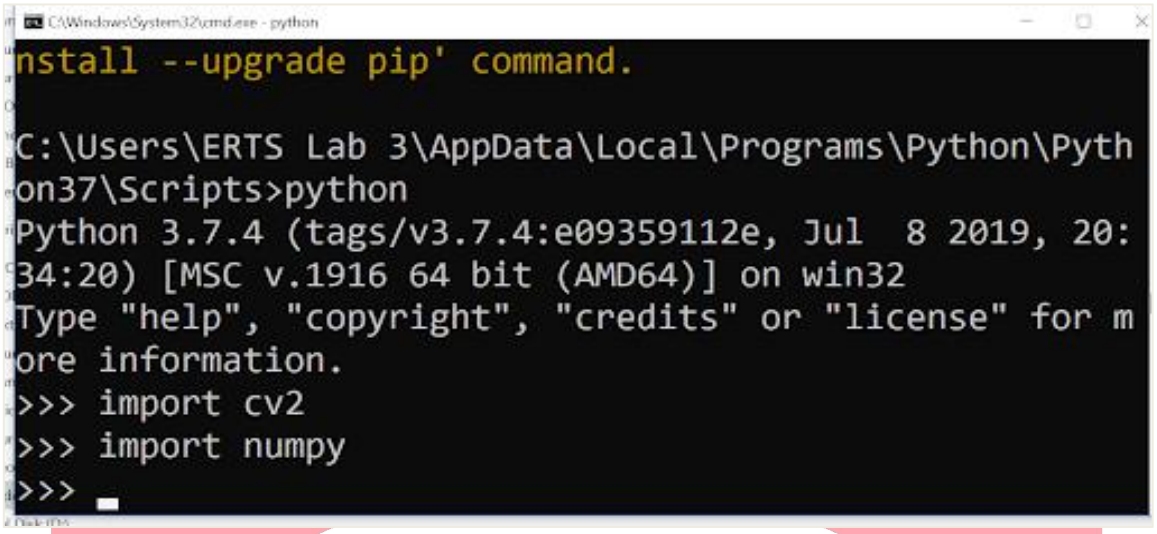




3. Once OpenCV is successfully installed it will specify the *"numpy"* and *"OpenCV"* versions installed. To verify in python, prompt the installation's success start python environment on command prompt by just typing "python" followed by the command at python environment's prompt (ensure 'I' is small for import):

import cv2

Note: OpenCV is addressed as *"cv2"*!
If successfully installed there will be no message and python prompt will return; else the exact error will be shown at python prompt (i.e. *cv2* does not exist) as depicted by success case in the figure below.



4. Similarly, you can test *numpy's* installation by typing the command:

   import numpy

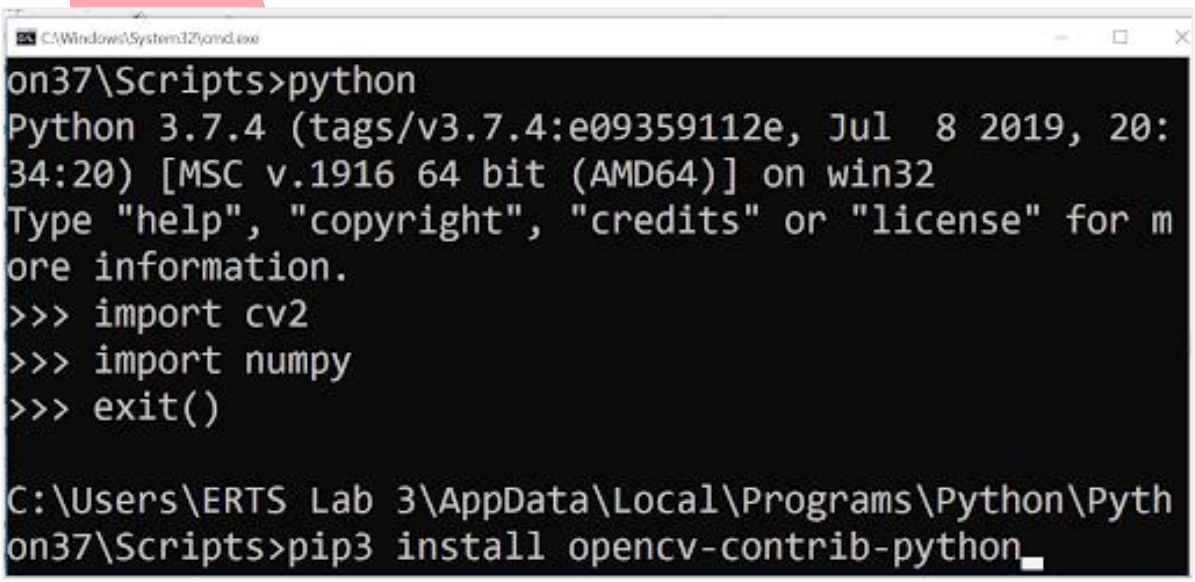
   Refer to the figure above. If successfully installed there will be no message and python prompt will return; else the exact error will be shown at python prompt (i.e. *numpy* does not exist)

   NumPy is a general-purpose library for processing data in arrays and matrices and in OpenCV we process images as arrays or matrices hence they are coupled.

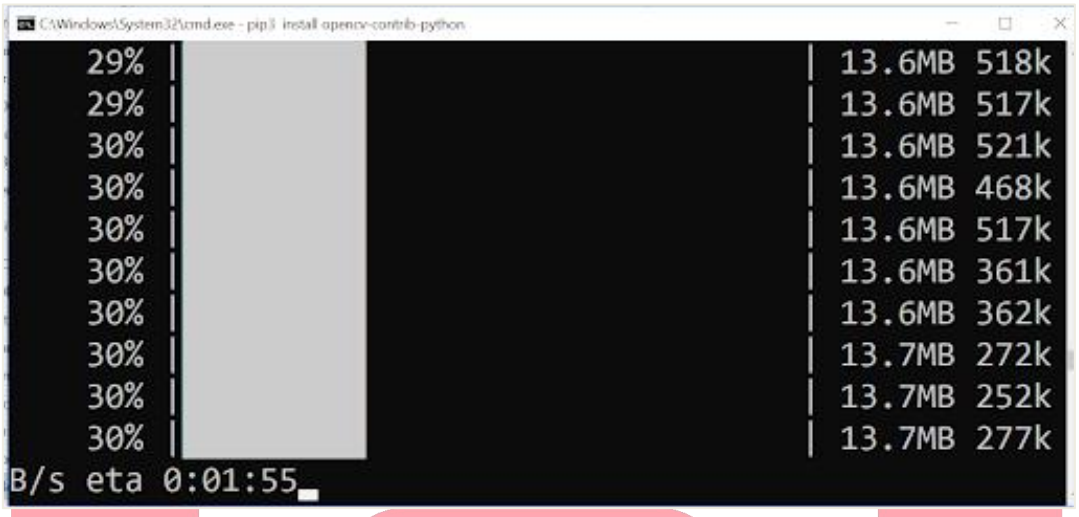
5. There are some additional features in OpenCV available in its *"contrib"* set of library functions. These too need to be installed by typing the following statement at command prompt:

   pip3 install opencv-contrib-python

   Refer figure below.



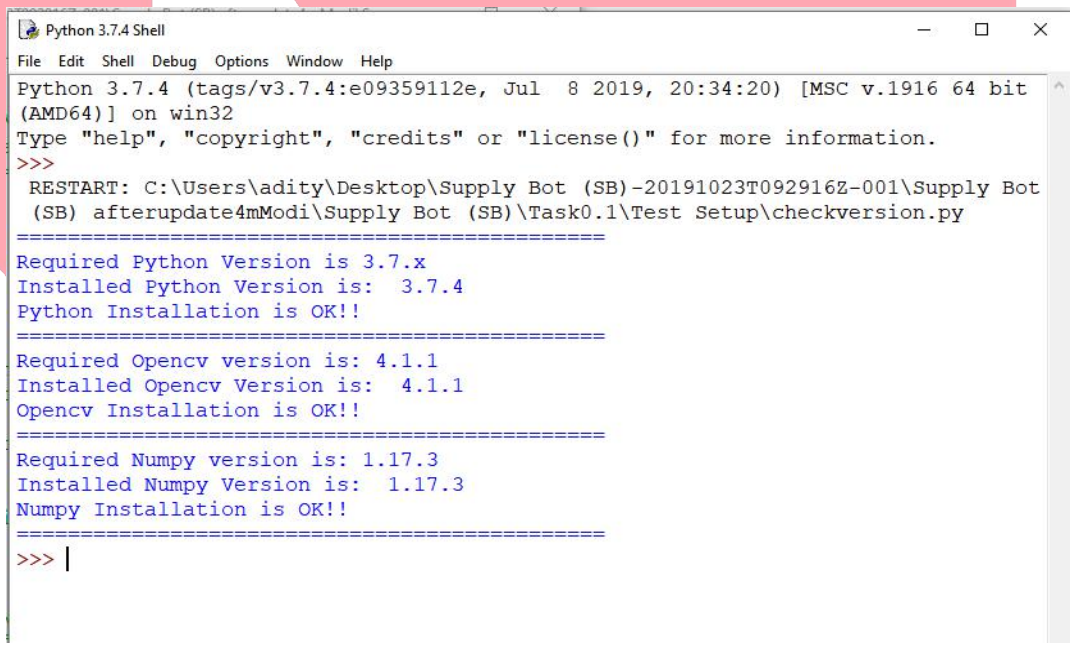
This will start installing python version of OpenCV's contrib modules on your system and the progress can be seen by a white progress bar increasing from left to right between two pipes | -> | as shown in the figure below.



6. Before this, to exit python prompt type the following command at python prompt:
   exit()

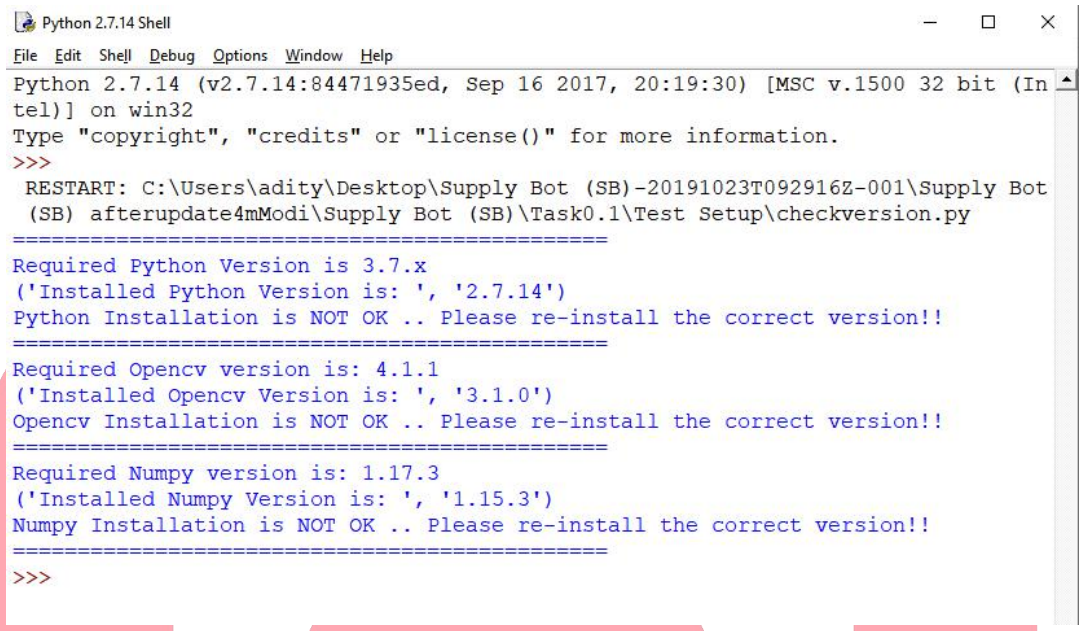
7. Now you are all set to program Image Processing Algorithms in python using OpenCV and NumPy.

8. Next to ensure you have the correct versions of Python and OpenCV, please run the script *checkversion.py* given in the **"Codes"** folder.
   NOTE: Use "***IDLE (Python 3.7 64-bit)***" for running the **checkversion.py** file also as previous version of IDLE might give error output
   On running the *checkversion.py* script you should get the following output window:



Correct Output

Following is an example of INCORRECT output window



Incorrect Output

NOTE: Save the screenshot of the **correct output** as ***"version.jpg"*** in main submission folder viz. ***SB#XXXX_Task0*** where ***XXXX*** stands for **team ID** as mentioned in the Submission Instructions in the Read Me file.