



# Image Understanding and Processing (OpenCv-Python)

## Lab Exercise – 01

Year 4

Semester 1, 2025

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### 1. Introduction to OpenCv

- OpenCV - Open Source Computer Vision Library.
- It is an open source computer vision and machine learning software library.
- It is built to provide a common infrastructure for computer vision applications and to accelerate the use of machine perception in the commercial products.
- The library has more than 2500 optimized algorithms.
- These algorithms can be used to detect and recognize faces, identify objects, classify human actions in videos, track camera movements, track moving objects, extract 3D models of objects, etc.

### 2. Introduction to Python

- Python is an open-source programming language.
- It allows you to run applications and plugins from a wide variety of 3rd party sources (or even applications you develop yourself) on your server.
- It is cross-platform, that you can run it on a number of different operating systems, including Windows VPS Server.

### 3. Introduction to Jupyter Notebook

- The Jupyter Notebook is an open-source web application.
- It allows you to create and share documents that contain live code, equations, visualizations and narrative text.
- Uses include: data cleaning and transformation, numerical simulation, statistical modeling, data visualization, machine learning, and much more.

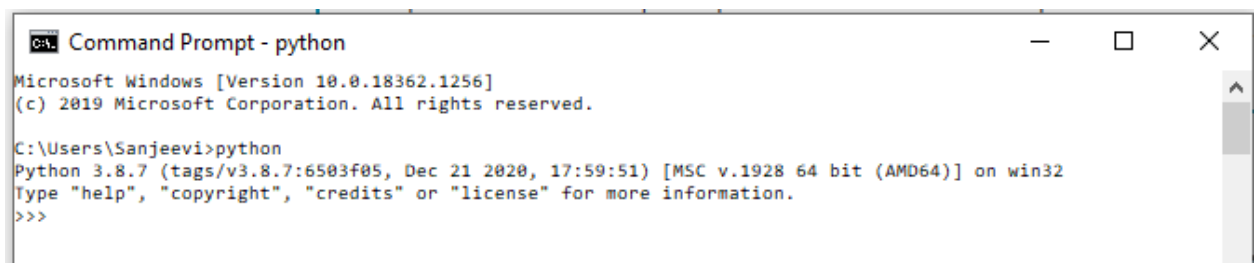
## 4. How to setup Jupyter Notebook

### Step 1: Installing Python in Windows

The leading Python site is on <https://www.python.org/>, and the most up-to-date source distribution version for windows is python 3.9.1. It is recommended use a lower version than the latest version.

### Step 2: Confirm that Python is installed

The simplest way to test for a Python installation on your Windows server is to open a command prompt. Once a command prompt window opens, type **python** and press **Enter**. If Python is installed correctly, you should see output similar to what is shown below.



```
Command Prompt - python
Microsoft Windows [Version 10.0.18362.1256]
(c) 2019 Microsoft Corporation. All rights reserved.

C:\Users\Sanjeevi>python
Python 3.8.7 (tags/v3.8.7:6503f05, Dec 21 2020, 17:59:51) [MSC v.1928 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license" for more information.
>>>
```

### Step 3: Installing Pip in Windows

Once you have confirmed that Python is installed correctly, we can proceed with installing Pip.

1. Download [get-pip.py](#) to a folder on your computer.
2. Open a command prompt and navigate to the folder containing the get-pip.py installer.
3. Run the following command:

```
python get-pip.py
```

### Step 4: Verify Installation and Check the Pip Version

We can now verify that Pip was installed correctly by opening a command prompt and entering the following command.

```
pip -V
```

### **Step 5: Installing OpenCv library using pip command**

After the installation of the Python and pip, we can directly install the OpenCV library and start using them. To install the library, we need to enter the given command in the terminal.

```
pip install opencv-python
```

### **Step 6: Installing matplotlib library using pip command**

Matplotlib is a comprehensive library for creating static, animated, and interactive visualizations in Python. To install the matplotlib, we need to enter the given command in the terminal.

```
pip install matplotlib
```

### **Step 7: Installing Jupyter notebook using pip command**

To install Jupyter notebook using Python's package manager, pip, we need to enter the given command in the terminal.

```
python -m pip install jupyter
```

### **Step 8: Run Jupyter notebook on Windows**

To run the notebook, run the following command in the terminal.

```
python -m notebook
```

### **Exercise: Write a small program to:**

1. To read and save the image from/in storage device.
2. To access pixel values of an image and modify them.
3. To access image properties.
4. To split and merge channels.
5. To resize/rotate image.
6. To draw circle/rectangle/lines.
7. To write text on image.
8. To convert color to grayscale/binary/negative image