Task 0

Learning Resources / Tutorials

[*Last Updated on:* ***5th October 2020, 20:34 Hrs***]

This document contains links for the Tutorials on:

- Python language
- Image Processing using OpenCV-Python, NumPy, Matplotlib
- Lua language

It also covers a basic tutorial on Linux for reference.

Note: The Linux tutorial is intended **only** for teams using Ubuntu OS.

A. Python

- These tutorials are provided in the format of **Jupyter Notebooks** OR **.ipynb** files embedded i a **.zip** file named, **python_tutorials.zip**.
- So, you can learn the syntax, edit them and try out at your end easily.

- Download these tutorials for various topics listed in the Table below. Right-click on the above hyperlink and select **Save Link As...** option to download.

#	Topic	Jupyter Notebook Filename
1	Getting Started	`01_Getting_started.ipynb`
2	Data types	`02_Data_types.ipynb`
3	Strings	`03_Strings.ipynb`
4	Mathematical Operators	`04_Mathematical_operators.ipynb`
5	Conditional Statements	`05_Conditional_statements.ipynb`
6	Loops	`06_Loops.ipynb`
7	Tuples	`07_Tuple.ipynb`
8	Lists	`08_Lists.ipynb`
9	Dictionary	`09_Dicts.ipynb`
10	Functions	`10_Functions.ipynb`
11	Modules	`11_Modules.ipynb`

- An `12_Exercise.ipynb` file is also provided for practice. Kindly note this exercise is **not graded**.
- To view and learn from these tutorials, open **Terminal** or **Anaconda Prompt** and navigate to the directory where these files are present.
- Activate the Conda environment and run the command: `jupyter notebook` .
- As explained in **Section 2C** of Software Installation document, this command will open the Notebook server in your default browser and you will be able to view the downloaded **.ipynb** files.

B. OpenCV, NumPy, Matplotlib

- You need to learn the following basic image processing techniques using OpenCV-Python, NumPy and Matplotlib from the below provided tutorial links.
    - Reading an image, displaying it and saving it back
    - Reading a video, displaying it and saving it back
    - Capture images from camera and displaying them
    - Writing video to a file

- Drawing different geometric shapes
- Image properties, splitting and merging images
- Arithmetic and Logical operations on images like addition, subtraction, bitwise operation etc.
- Converting images from one color-space to another, like BGR-to-Gray, BGR-to-HSV, etc.
- Extract or mask object of particular color in given image

- Learn about these various concepts from the Image Processing, NumPy and Matplotlib tutorials provided officially by **OpenCV**, **CS231N** course at **Stanford University** and from the ones created by **e-Yantra** team.
  - Tutorials by **OpenCV**:
    - Introduction to OpenCV
    - GUI features in OpenCV
    - Core Operations - Basic and Arithmetic Operations on Images
    - Image Processing in OpenCV - Changing Colorspaces, Image Thresholding, Contour in OpenCV
  - Tutorials from **CS231N course**:
    - Python language
    - NumPy
    - Matplotlib
  - Tutorials by **e-Yantra** team:
    - These tutorials are provided in the format of **Jupyter Notebooks** OR **.ipynb** files embedded in a **.zip** file named, **opencv_tutorials.zip**.
    - Download these tutorials for various topics listed in the Table below. Right-click on the above hyperlink and select **Save Link As...** option to download.

#	Topic	Jupyter Notebook Filename
1	Introduction to OpenCV	`01_Intro_to_OpenCV.ipynb`
2	Introduction to NumPy	`02_Intro_to_NumPy.ipynb`
3	Introduction to Matplotlib	`03_Intro_to_Matplotlib.ipynb`

#	Topic	Jupyter Notebook Filename
4	Color Models	`04_Color_Models.ipynb`
5	2D Transformations	`05_2D_Transformations.ipynb`
6	Arithmetic and Logical Operations	`06_Arithmetic_Logical_Operations.ipynb`
7	Historgram	`07_Histogram.ipynb`

C. Lua

- Follow these links to learn about Lua syntax and basics.
    - Lua Tutorial - Tutorialspoint
    - Learn Lua in 15 Minutes
    - Learn Lua in One Video
    - Cheat Sheet from the above video
    - Official Programming in Lua eBook
- You can use any editor to write and practice **Lua** syntax. We suggest to use **Repl.it** online IDE, which has support for many languages.

D. Linux

- **NOTE:** This tutorial is intended **only** for teams using Ubuntu OS.
- A tutorial covering the basics of Linux is created by **e-Yantra**. Download it from here.
