Assignment-1: Warm-up

Instructions:

[1] Any plagiarism will lead to award of **F grade** STRICTLY
[2] Use python only for the implementation of all the assignments
[3] Use NumPy to represent the vector and array
[4] Do not use the inbuilt functionality of any library including NumPy until suggest so.
[5] PyTorch must be used to implement the deep learning-based methods.
[6] One mark will be deducted for each late day.
[7] Submit via Moodle only. Email submissions won't be considered.

No.	Question	Marks
1	Data source: ImageNet: http://www.image-net.org Write a program to 1. load an RGB image of any image format (JPG, PNG, etc.) and size using OpenCV and convert it to gray image with a resolution of 256x256. 2. Display both RGB and Gray image side-by-side using matplotlib 3. Save the Gray image as <same-name>.JPG. 4. Flip the RGB Image horizontally and vertically and display the original and flipped images side-by-side. 5. Perform random crops of 128x128 and rescale it to 256x256. Display the center point and a rectangle of 128x128 on the RGB image and cropped & scaled image side by side.	10 2 2 2 2 2
2	Data source: Use videos from KTH: https://www.csc.kth.se/cvap/actions/ and UCF101: https://www.crcv.ucf.edu/data/UCF101.php Write a program to load a sample video of any video format (AVI, MP4, etc.) using OpenCV and extract its every kth frame (k is used specified) with original color representation (RGB/Gray) and rescale to 256x256 size and save them with <frame-number>.JPG to a folder <video-name>	5
3	Data source: MNIST: http://yann.lecun.com/exdb/mnist/ 1. Write a program to represent each image in train/test datasets to a frequency histogram and save to comma separated values (CSV) files as train.csv and test.csv 2. Normalize each feature to N(0,1) also apply the respective transformations to test data. 3. Use the t-SNE plot of the dataset with different color to different class. T-SNE: https://scikit-learn.org/stable/modules/generated/sklearn.manifold.TSNE.html 4. Implement the least square method and evaluate on the dataset generated. Use for any two classes as well as all classes.	**10** 4 1 1 4
4	Data source: ImageNet: http://www.image-net.org Write a program to: 1. load an RGB image of any image format (JPG, PNG, etc.) and resize using	10

	OpenCV with a resolution of 256 x 256. 2. Extract following features (**LBP, HoG, SIFT, BoW**) from the image and do k-mean clustering with **k = 3** and **k= 6** and plot those cluters in 2-D space.	