

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	<p>Data source: ImageNet: http://www.image-net.org</p> <p>Write a program to</p> <ol style="list-style-type: none"> 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. Display both RGB and Gray image side-by-side using matplotlib Save the Gray image as <same-name>.JPG. Flip the RGB Image horizontally and vertically and display the original and flipped images side-by-side. 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. 	<p>10</p> <p>2</p> <p>2</p> <p>2</p> <p>2</p> <p>2</p>
2	<p>Data source: Use videos from KTH: https://www.csc.kth.se/cvap/actions/ and UCF101: https://www.crcv.ucf.edu/data/UCF101.php</p> <p>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></p>	5
3	<p>Data source: MNIST: http://yann.lecun.com/exdb/mnist/</p> <ol style="list-style-type: none"> 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 Normalize each feature to N(0,1) also apply the respective transformations to test data. 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 Implement the least square method and evaluate on the dataset generated. Use for any two classes as well as all classes. 	<p>10</p> <p>4</p> <p>1</p> <p>1</p> <p>4</p>
4	<p>Data source: dataset generated in Q-3</p> <p>Write a program for the Principal Component Analysis (PCA) from scratch. Compute the coefficients from the train.csv and apply on both train.csv and</p>	10

	test.csv use 2D scatter plot to visualize both the datasets separately using PC1 vs PC2.	
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