E9 246: Assignment 1 (Due 25 March, 2021)

In this assignment, you will implement a part of SIFT features and also some important concepts of CNN for image classification. For this experiment, use the given data. Take the 20 images from the test folders for testing.

Q1) **SIFT:** Choose around two images of your choice. Implement the first step of SIFT: i.e. scale-space extrema detection. Modify the images (rotate, scale, blur, add noise, etc.) and then re-do the keypoint detection step. Qualitatively analyze the keypoints that are detected.

Q2) **For CNN features:**

A) Load pre-trained AlexNet/any other pre-trained model and extract deep features for the given images. Evaluate image classification accuracy (using NN/KNN classifier) using these features. Extract the features from the last/second-last fc layer.

2) Fine-tune the classification layer for these 4 classes using the training data given (and additional data if you want) and report the performance.

(Extra Marks = 4) Optional: Create a simple network from scratch and train using the same set of classes with CE loss. If required, you can include additional images for training. Report the accuracy of your model on the same set of test images.

You should include the following things in your report:

1. Details of your implementation. Give examples of images to support your analysis. Any learnings / problems faced?

2. Comparison between the different parts of Q2. .

3. You should give the link to codes used, and other details. There is no need to include descriptions of SIFT and AlexNet/pre-trained model used.

4. Extra marks will be given for the optional part.

Marks: 12 marks for completing all parts of the assignment, 5 marks for analysis, 3 marks for writing report properly (brief and to-the-point report will be preferred).