E9 246 Advanced Image Processing

Assignment 01

Due Date: 4 Feb, 2024 **Total Marks:** 40

Instructions:

- Try to use Google Colab to avoid computational issues on your laptops. You can use any open-source deep learning libraries like PyTorch, TensorFlow, etc.
- Along with your code, also submit a report with all the results and inferences.
- Put all your files into a single zip file and submit the zip file. Name the zip file with your name.

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1. **PCA-SIFT** **(20 Marks)**

   - Compute the PCA-SIFT feature descriptors for the images given here (You can ignore the second step).
   - Modify the images by (a) Scaling, (b) Rotation (c) Gaussian blur and obtain the keypoints for these images.
   - Analyse the keypoints detected qualitatively and quantitatively (number of keypoints detected in each case).

2. **Image Classification** **(20 Marks)**

   - Build a custom CNN with conv, sigmoid, pooling and fc layers. Train the network for the CIFAR-10 dataset given [here] using the training data and report the performance on test data. Change the non linearity to ReLU, train and test the model. Compare the results obtained using these two models.
   - Evaluate the accuracy on the additional test set given. here.

You should include the following things in your report:

- Details of your implementation. Give examples of images to support your analysis. Any learnings or problems faced?
- Comparison between the different parts of Q2.
- You should give the link to codes used, and other details. There is no need to include descriptions of PCA-SIFT and the pre-trained model.