E9 246 Advanced Image Processing

Assignment 02

Due Date: 18 Feb, 2023 **Total Marks:** 25

Instructions:

- To extract deep features, you can use any open-source deep learning libraries like PyTorch, TensorFlow, Keras, etc.
- Try to use Google Colab to avoid computational issues on your laptops.
- 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. **N-Cut** **(10 Marks)**

   - Implement the N-Cut algorithm to segment the images into two segments. Test it on the images given here.
   - Modify the images by (a)Rotation (b)Add Gaussian noise. Now re-do the segmentation.
   - Perform N-Cut using two similarity measures. Qualitatively analyze the results.

2. **Fully Convolutional Networks** **(15 Marks)**

   - Take a ResNet50 based FCN trained on PASCAL VOC dataset (Available in Pytorch). Evaluate the pixelwise accuracy and meanIOU on the given test set. Please download the dataset from here.
   - Take a MobileNetv2 backbone pretrained for ImageNet classification. Modify the last FC layers to convert it to an FCN. You can omit the skip connection part. Train this MobileNetv2 based FCN on the given dataset. Then, evaluate the pixelwise accuracy and meanIOU on the test set.
   - Compare the results from the above two trained models.
   - For the given test images *test4.jpg* and *test5.jpg*, compare N-Cut segmentation results with that of FCN. Transform the images by (a)Rotation (b)Add Gaussian noise and compare the two methods for these transformed images.

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?
- These two algorithms cannot be compared directly. Qualitatively compare the two approaches (in terms of high-level idea, training, testing, results)
- You should give the link to any opensource codes referred, and other details. There is no need to include descriptions of N-Cut and FCN.