E9 246: Advanced Image Processing

Assignment 2

Due Date: 23 Feb, 2024 **Total Marks:** 25

Instructions:

- 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.

---

1. **Classical methods: N-Cut, K-means** **(10 Marks)**

   - Implement the N-Cut algorithm to segment the images into two or more segments (More than two segments for at least one image). Test it on the images given here.
   - Perform N-Cut using two similarity measures.
   - Perform K-means based image segmentation for these images. Vary K between 3 to 6 to get coarse to fine grained segmentation. You can use already available k-means code.
   - Qualitatively analyze all the results.

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

   - Take a ResNet-18 backbone pretrained for ImageNet classification. Modify the last FC layers to convert it to a Fully Convolutional Network inorder to perform Image Segmentation. Implement two variants: (1) without skip connections. (2) with skip connections.
   - Train these ResNet-18 based FCNs on the dataset given here. Then, evaluate the pixelwise accuracy and meanIOU on the test set.
   - Compare the results from the two variants of FCN.

You should include the following things in your report:

- Details of your implementation. Give examples of segmented images to support your analysis. Any learnings or problems faced?
- 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.
- All results and analysis should be included in the report.