Computer Vision (CSL7360)

Programming Assignment-2 (100 marks)

Instructions:

1. Do not copy from other students. Any case of plagiarism will result in zero marks.
2. This is an individual assignment.
3. You can refer to codes online (e.g., Github, Kaggle), but do not copy-paste. The resource must be cited in the report if referred.
4. Strictly follow the submission guidelines.
5. Allowed languages: python

Submission Guidelines :

- **Submit .py python files and .ipynb (with proper output blocks)** for all the questions.
- **Strictly submit a single report (.pdf) for all the questions.** No .doc, .docx file will be accepted. Your report should include all the analysis and detailed observations.
- If you are using Colab, then attach your Colab link in the report (preferred). Make sure the submitted files do not have restricted access to it.
- Submit a single zip file containing all Python files and reports.
- The name of the zip file should be roll_no.zip, and Python files should have the name, e.g roll_no_qu1.py or roll_no_qu2.py, etc. The report should have the name roll_no.pdf. Include the .ipynb file as well.

If the naming convention is not followed, we will award zero marks.

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1. **Segmentation:** Your task is to implement the Ratio-Cut based clustering technique and compare it with the K-means clustering technique. Use the number of clusters as 3 and 6 for both techniques. You have to do the following:
   [100 Marks]
   - Implement the algorithm **from scratch**. You should not use any in-built functions to directly get the segmentation. You can use the inbuilt function to perform simple kmeans, get eigenvalues, eigenvectors, etc.
   - **Resize the size of the images to 64x64** to reduce the computation complexity.
   - Make the code modularise to take images from the folder as an input.

- Compare the performance of the two techniques on Image 1 and Image 2, i.e., compare the 4x2 cases.
- The input images are present in the following location: https://bit.ly/cvasg2img

ADDITIONAL INSTRUCTIONS:

1. **Make sure that you submit a running code. We will schedule a viva session later for the code demonstration.**
2. If you are submitting a collab file, make sure to provide relevant access before sharing it.
3. STRICTLY FOLLOW THE SUBMISSION GUIDELINES.
4. **When you are implementing from scratch, you can only use the opencv libraries for basic operations such as reading, saving the images, or performing operations such as cv2.cvtColor.**
5. **You can use inbuilt functions to find eigenvectors and eigenvalues, perform simple kmeans clustering.**

DelayPenalty: Upto 1 day: 10%, upto 2 days 20%, upto 3 days 20%, beyond 3 days 100%