Homework 11

Unsupervised Image Segmentation

Description

In this assignment, you will apply K-means algorithm, and Mean-Shift algorithm for unsupervised segmentation in images [1].

Tasks

The specific steps for this task are:

Part A:

1. *Please detail the differences between unsupervised image segmentation methods and supervised semantic image segmentation methods*
2. *Name well known methods from each of the above categories*

Part B:

1. Using a colored image of your choice, apply the K-means algorithm and report the output using two different values of *k* (your choice). You must place the image in the root directory of your repository and code must be able to load the image.
2. Using the elbow method, identify the optimal value of *k* and report your result. What do you notice?
3. Using the same image as in 1, now apply the Mean-Shift clustering algorithm and report your results.
4. Is image thresholding a form of unsupervised image segmentation?
5. What are some differences between K-means and Mean-Shift?
6. What are some of their limitations?

Submission Guidelines

- Submit your working code in Teams (**both as an .ipynb and a .pdf file**)
- Upload any .zip file or folder if your code refers to the paths of those files.
- **A pdf of your report (name: HW11- PartX-Report-Firstname-Lastname.pdf) with your output and comments**

References

[1] “Image Segmentation using K-means Clustering Algorithm and Mean-Shift Clustering Algorithm”, https://medium.com/@muhammetbolat/image-segmentation-using-k-means-clustering-algorithm-and-mean-shift-clustering-algorithm-fb6ebe4cb761

[2] “Image Thresholding”
https://docs.opencv.org/3.4/d7/dd0/tutorial_js_thresholding.html

[3] “Contour Detection using OpenCV (Python/C++)”
https://learnopencv.com/contour-detection-using-opencv-python-c/#Steps-for-Finding-and-Drawing-Contours-in-OpenCV

[4] “Semantic Segmentation using PyTorch”,
https://debuggercafe.com/semantic-segmentation-using-pytorch-deeplabv3-and-lite-r-aspp-with-mobilenetv3-backbone/

[5] “MODELS AND PRE-TRAINED WEIGHTS”, Pytorch
https://pytorch.org/vision/stable/models.html

[6] “Getting Started with Videos”, OpenCV
https://docs.opencv.org/3.4/dd/d43/tutorial_py_video_display.html