Computer Vision (CV)

Programming Assignment 3

Deadline: May 25, 2020

Question 1: Stereo Vision **[20]**

Click some pictures of different scenes and show their disparity maps. Also calculate their depth maps. Explain the working of the inbuilt function you have used in detail in the report.

Question 2: Object detection **[20]**

Implement Viola-Jones object detection algorithm from scratch. Test your code with any 10 images and report the results.

Question 3: Face detection and Tracking **[30]**

Capture a video of a person whose face is visible most of the time. Use a pre-trained Viola-Jones face detector to detect the face in the first frame and after that use Optical Flow algorithm to continue tracking it in the rest of the video frames. Report the intermediate results and explain the working of the algorithm. You can test the algorithm with more videos.

Question 3: Object Recognition **[40]**

Use the CIFAR10 dataset for this question.

Extract the following features from the images and train a 2-layer neural network for classification.

a. Local Binary Patterns (LBP)
b. Scale-Invariant feature Transform (SIFT)
c. Deep features (Use AlexNet pre-trained on Imagenet to extract the 4096 dimensional feature vector)
d. Deep features (Use ResNet18 pre-trained on Imagenet to extract feature vector)

Report the classification results and do some comparative analysis between them.

Question 4 (bonus question): Use a deep learning model to perform semantic segmentation. You can use the data mentioned in the following resource web:

Resource (but do not copy from here):

https://towardsdatascience.com/semantic-segmentation-the-easiest-possible-implementation-in-code-193bf27b86b8

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[VIVA + REPORT : 30 + 50]
[Bonus: 10]

Submission Policy and Requirements

1. This is a graded assignment.
2. The report should be detailed and clearly explaining every step you have followed. All the intermediate outputs, their inferences should be present in the report.
3. If you are using any inbuilt function, you should know the working of it. Just using the function and not being able to explain the working during viva will reduce the marks of that question to half.
4. Recommended programming languages: python + opencv.