EEE 584/CNG 583 Assignment #1

A folder, containing 39 consecutive image files, was uploaded to METU-CLASS. Download this folder, and perform the following operations. You are free to use any programming platform (e.g. Matlab, Python, etc) with built-in functions/libraries.

1- Read Frame1, and convert to gray-scale. Show the gray-scale image.

2- Find Gradient of gray-scale Frame1 in x- and y-directions using the 'Sobel operator'. Then evaluate and show the Edge strength map.

3- Generate and show the intensity histogram of gray-scale Frame1 to see the distribution of pixel values.

4- Generate intensity histograms of gray-scale Frame1, Frame20 and Frame35. Then, compute the Manhattan distance between pairs of histograms separately, and show your results. Which of the two images are the most similar?

5- Given the 39 consecutive frames in the folder, write a code for background modeling with univariate Gaussian density function. In this model, the density function of each pixel is characterized by mean and standard deviation values. Display both the mean and standard deviation images.

Then take the Frame30.jpg image as an input to the density functions, and generate a likelihood value for each pixel. Apply a proper threshold (T = 0.006) to the Gaussian density function outputs to perform moving object segmentation. Display the binary segmented image with the threshold value 0.006.

6- Use a ready code of Lucas-Kanade optical flow algorithm to compute optical flow between Frame3 and Frame5. Display optical flow vectors on Frame5.

Then compute optical flow magnitude for each pixel, and apply a proper threshold to optical flow magnitude image for moving object segmentation. Display the optical flow magnitude image, and binary segmented image.

Note: Provide the code, and the results displayed at each part. Submit as a .pdf file to the assignment folder on METU-CLASS.