EE6310 Image and Video Processing, Spring 2016

Indian Institute of Technology Hyderabad
Homework 0, Assigned 07.01.2016, Due **11:59 pm on 14.01.2016**

Remarks:

- While discussion of homework problems is encouraged in general, it is **strongly recommended** that the final solution is prepared on an *individual* basis.
- Download images from University of Southern California's image database at `http://sipi.usc.edu/database/database.php?volume=misc`.

1 Binary Morphology

For this part, work with the images *airplane, truck, airport, APC*.

1. Write a function to compute the histogram of an image and plot the same. What is the modality of the histogram for the images mentioned above? It may help to vectorize the image for this question.
2. Binarize I using the above histogram following the modal thresholding approach discussed in class. Compare this image with the binary image in the last step of the previous problem.
3. Implement the connected components algorithm and use it to label the binarized version of I.
4. Implement minor blob removal to get rid of minor blobs.
5. Now implement the following filters that take a binary image I and window B as inputs: DILATE, ERODE, MEDIAN. Filter the above binary image using the following windows B = CROSS(5), B = SQUARE(3).
6. Following the development in class, implement the compound operators OPEN and CLOSE using the basic filters implemented above. Filter the binary image from the problem before last using the same windows as above.
7. Finally, implement OPEN-CLOS and CLOS-OPEN. Filter the binary image using the same windows as above.
8. For the *APC* image, count the number of pixels in the object of interest - i.e., the military vehicle.