School of Computing
National University of Singapore
CS4243 Computer Vision and Pattern Recognition
Semester 1, AY 2018/19

Lab 2 – Histogram Equalization

Objective:

To understand the materials covered in the lectures through

- Implementing histogram equalization using Matlab codes

Preparation:

- Download from IVLE and uncompress the folder meteora_penang_carpark.zip. You should find the following pictures in the folder: meteora_gray.jpg, penang_hill_gray.jpg, foggy_carpark_gray.jpg
- Copy these pictures into your working directory.

Histogram Equalization

This is an exercise to make sure you understand histogram equalization. You must write matlab code to do histogram equalization on a grayscale image. Specific instructions are:

- Matlab has the following functions, **do not use** them!
  - *histeq -- this is Matlab built-in function for histogram equalization*
  - *hist, histogram – these are Matlab built-in functions for constructing histogram*
  - *cumsum – these are Matlab built-in functions for cumulative sum*

- You must implement histogram equalization by writing the Matlab code by yourself (i.e. you cannot get the codes from elsewhere).

Task-1

- You need to run your code to do histogram equalization on all the pictures in pic.zip.
- Use the following codes to plot and save the results into files:

```
FNames = {'meteora_gray.jpg';
          'penang_hill_gray.jpg';
          'foggy_carpark_gray.jpg'};
  :
  :
  :
for p = 1 : size(FNames)

    figH = figure;

    subplot(3,2,1), imshow(pic, [0 255]);
    title('original image');
    subplot(3,2,2), imshow(hPic, [0 255]);
    title('hist equalized image');
    subplot(3,2,3), plot(h_before);
    title('original histogram');
    subplot(3,2,4), plot(h_after);
    title('equalized hist');
    subplot(3,2,5), plot(c_before);
    title('original cumu hist');
    subplot(3,2,6), plot(c_after);
    title('equalized cumu hist');

    baseName = FNames{p}(1:find(FNames{p}=='.')-1);
    figName  = strcat(baseName, '_histogram_eq_results.jpg');

    print(figH, '-djpeg', figName);
end
```

Task-2:

Crop away the top halves of all three images, then repeat Task-1.

Some hints:

- You can use *imread* for reading pictures. Do a *help imread* to see how to use it.
- You can use *imshow* to display pictures.
- You can use *round* to round floating points to integers.
- You can use *size* to check the dimensions of a matrix.
- You can use *length* to check the length of a vector.

Submission Instruction

Submit the following to IVLE by 2359hrs on 9th Sep 2018 (Sunday).

Submit the softcopy of your Matlab code to IVLE. Submit also the figures plotted for each of the pictures.

Please put your Matlab code and the figures in a folder and submit the folder. Use the following convention to name your folder:

StudentNumber_yourName_Lab2.

For example, if your student number is A1234567B, and your name is Chow Yuen Fatt, for this lab, your file name should be *A1234567B_ChowYuenFatt_Lab2*.