Image processing

ASSIGNMENT 2: SPATIAL METHODS (2024)

For this assignment you must write a short report in any word processor of your choice (MSWord, Latex, ....) where you explain your methods and show your results. All input and output images must be shown (preferably so that they can be compared on the same page). Add the code in an Appendix.

1. For the image OnFerry.jpg
   1. brighten the image by a suitable gamma-transformation,
   2. do histogram equalization of the image,
   3. design a point transformation that will brighten the image in general but in addition do contrast stretching for the passengers and seats.
2. Pick a grey-scale image of your own choice (preferably not too crowded with detail).
   1. Use an *N × N* (*N* is odd) smoothing mask and illustrate smoothing on the image. Do not choose *N* too large.
   2. Use the same *N × N* smoothing mask and apply unsharp-masking to the image, by sub- tracting the smoothed image from the original image and adding *k* times this to the original image. Choose the weight *k* suitably.
3. Take a color image of your choice that is under-illuminated.
   1. Do histogram equalization separately on each of the colour matrices R, G, and B, and display the combined image. Why is this a bad choice?
   2. Find the histogram equalization point transformation obtained from the intensity image (the mean of R, G and B) only. Apply this to each of R, G, and B, reassemble and display the result.
   3. Do HSI conversion. Then do histogram equalization of all three matrices H, S, and I, and reassemble as an RGB image Display the result and explain.
   4. Do histogram equalization only of the I-image, keeping the S- and H- images intact, reassemble as an RGB image, and display. Explain your result.

Hint for MATLAB users: MATLAB has functions rgb2hsv and hsv2rgb, but beware that the maximum is sometimes 1 and not 255.