

Note: You may use the following MATLAB functions for this lab: `imhist`, `imfilter`, `sort`, but you are not allowed to MATLAB functions that directly perform Histogram Equalization/Specification.

1. Implement the Histogram specification algorithm using the two approaches discussed in class: (a) via $T_2^{-1} \cdot T_1$, and (b) exact histogram specification. Name the two files `myhistspec.m` and `myexacthistspec.m`. In the first case, the input to the function should be two vectors p_R and p_S , the input and specified distribution functions, each of size $L \times 1$, while the output should be a vector containing $T_2^{-1} \cdot T_1(r_k), k = 0, \dots, L - 1$. In the second case, the input to the function should be an image I , the specified distribution function p_S as an $L \times 1$ vector, and k , the number of neighborhoods to be considered for inducing a total order on the pixels. The neighborhoods used should be of size $(2j + 1) \times (2j + 1), j = 1, \dots, k$. The output of this function should be the output image with the desired distribution p_S , only if the given k number of neighborhoods induce a total order. Otherwise, the function should simply give out the error message: The neighborhoods do not induce a total order on the pixels of the given image.
2. Design the distribution function p_S so as to improve the contrast in at least TWO of the images given in Figure 1, and plot the selected p_S and the images produced using both algorithms for the chosen p_S in your report. By improving contrast, I do not mean obtain an image with uniform distribution at the cost of distorting the image. You may provide output images, for at most 2 different p_S 's you think are good.

Submission Instructions

1. Make a folder named `ID_No_Lab2` containing the two MATLAB functions `myhistspec.m` and `myexacthistspec.m`, and your report `ID_No_Lab2.pdf`.
2. Submit only ONE zipped file `ID_No_Lab2.zip` (containing the above folder) per group on the course webpage, on or before **17:00 hrs Wednesday, 31st January, 2018**.

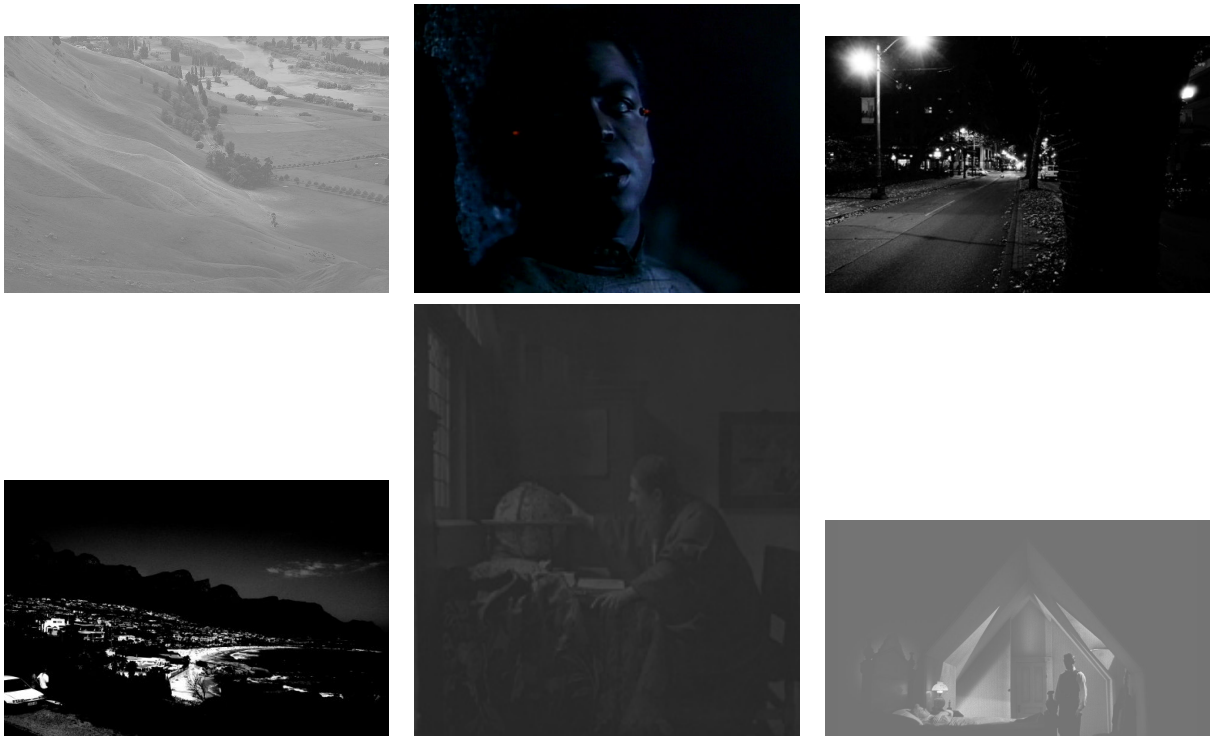


Figure 1: Names of the image files, from left to right, top to bottom: pc5, pc6, pc7, scene, pc2, pc3. In case an image is an RGB-valued image, convert it into grayscale using the MATLAB function `rgb2gray`.