h1: Histogram Equalization

For a continuous cumulative distribution function F defined on $(0, b)$, given an integer $1 \leq L \leq 255$, we can usually find $0 \leq r_1 \leq r_2 \leq \cdots \leq r_L$ such that $F(r_j) = \frac{j}{L}, \quad for\ j = 1, 2, \cdots, L$. For a discrete case, an approximation could be made to have similar results under some constraints. This encourages the usage of Histogram Equalization to do contrast enhancement as well as data compression for images.

It is well known that most of the gray level images do not really require an 8-bit representation for each pixel, in particular, a pixel of texture images may even be coded in no more than 5 bits (or 32 levels). This project is to study the effect of Histogram Equalization on textures and other natural images.

You are asked to write a histogram equalization program to run for texture images as well as for other natural images to check how many gray levels are good enough for coding an image.

D04.raw - 512×512 image

D23.raw - 512×512 image

D24.raw - 512×512 image

D77.raw - 512×512 image

lenna.raw - 512×512 image

mandrill.raw - 512×512 image

The input images can be acquired via the following website:

http://www.cs.nthu.edu.tw/∼cchen/.WWW/Imagedata

You have to turn in the source codes of your programs in C/C++ or Matlab codes, and your results of Histogram Equalization on the test images with gray levels 8, 16, 32 associated with the original images with up to 256 possible gray levels.