

R·I·T

Foundations of Imaging Science - Digital Image Processing Histogram Processing

1. Use the tools you have at your disposal to develop a lookup table (LUT) to perform histogram equalization on the satellite image of the pyramids at Giza

<http://www.cis.rit.edu/~cnspci/courses/common/images/giza.jpg>

and apply it to the image. In order to apply this LUT to the image in ImageJ, the LUT needs to be in a binary format and imported (File > Import > LUT ...). To create this ImageJ-specific formatted LUT file, a Java utility

<http://www.cis.rit.edu/~cnspci/courses/common/software/CreateImageJLut/CreateImageJLut.jar>

has been prepared for you that accepts a columnar color table in CSV (comma-separated value) format such as you might create in Microsoft Excel (make sure that when you download this file it has a .jar extension on it - Windows sometimes tries to give this file a .zip extension instead). The table should have 3 columns (each column representing the red, green, and blue color) and 256 rows (each row representing a color table value).

For example, a color table for a negative greyscale lookup table may look like this

255,	255,	255
254,	254,	254
253,	253,	253
252,	252,	252
.	.	.
.	.	.
.	.	.
2,	2,	2
1,	1,	1
0,	0,	0

Produce a plot of the original image histogram, the LUT you produce, and the histogram of the image after the equalization LUT has been applied. You must also include a screenshot of the image both before and after the LUT enhancement.

2. Use the tools that you have at your disposal to develop a histogram matching lookup table (LUT) to perform histogram matching between the image of the pyramids at Giza

<http://www.cis.rit.edu/~cnspci/courses/common/images/giza.jpg>

and the greyscale image of Lena

<http://www.cis.rit.edu/~cnspci/courses/common/images/lena-256x256.jpg>

You should force the image with the lower dynamic range to take on the histogram of the image with the higher dynamic range.

Produce plots of the histograms of both of the original images, the histogram matching LUT, and the histogram of the enhanced image. Include screenshots of both original images as well as the enhance image.