

EE5356 LAB Assignment #1

Quantization

Apply the following 3 quantization schemes to a test image (8bpp 256 level gray scale).

- 1) **Uniform quantizer**
Calculate and compare those three quantizers (128,64,and 32 levels) in terms of the PSNR and MSE.
- 2) **Contrast quantizer (See Figure 4.21 in the text book pp.120)**
Use the equation (4.65) to design 3 different uniform quantizers. Let $a = 1$ and $b = 1/3$. Those quantizers have the different number of quantization levels, 40, 60, and 80, respectively, and then compare in terms of the PSNR and MSE.
- 3) **Pseudorandom quantizer (See Figure 4.22 in the textbook pp.121)**
Design a 3bit quantizer. Use three different values of A for pseudorandom noise generator and compare in terms of the PSNR and MSE.

NOTE:

You may choose a test image from the UTA DIP website at

<http://www-ee.uta.edu/dip>

or Dr.Rafael Gonzalez's web site at

http://www.imageprocessingbook.com/downloads/book_images_downloads.htm . (All the images are in jpeg format.)

Also, go to data base in the class website..

MSE (mean square error) is given by

$$MSE = \frac{1}{N^2} \sum_{i=1}^N \sum_{j=1}^N (x(i, j) - \bar{x}(i, j))^2$$

where x is an original 8bpp $N*N$ image and \bar{x} is the quantized $N*N$ image.

PSNR (peak signal to noise ratio) is given by

$$PSNR = 10 \log_{10} \frac{255^2}{MSE}$$

References:

- 1) Textbook pp.99-123
- 2) Rafael C. Gonzalez and Richard E.Woods, "Digital image processing", Prentice Hall 2002