Department of Computer Science and Engineering
National Institute of Technology, Hamirpur

Digital Image Processing CS-325

Laboratory Assignment -2

Topic: Digital Image Histogram Equalization implementation and interpretation of results

1. Design a program to read a .jpg file and apply histogram equalization on each of the RGB plane of Fig. 1-5. Show the input image and processed (output) image with corresponding histograms. Write the conclusion based on the observation of the output image in terms of dynamic range, contrast, light, dark and dull images.

2. Formulate a program to read a .jpg file and apply histogram equalization on average gray-scaled image of original images of Fig. 1-5. Show the input image and processed (output) image with corresponding histograms. Write the conclusion based on the observation of the output image in terms of dynamic range, contrast, light, dark and dull images.

Study/ Help Material

Suppose that a 3-bit image (L = 8) of size 64 × 64 pixels (MN = 4096) has the intensity distribution in Table 3.1, where the intensity levels are integers in the range [0,L − 1] = [0, 7].

r_k	n_k	$p_r(r_k) = n_k/MN$
$r_0 = 0$	790	0.19
$r_1 = 1$	1023	0.25
$r_2 = 2$	850	0.21
$r_3 = 3$	656	0.16
$r_4 = 4$	329	0.08
$r_5 = 5$	245	0.06
$r_6 = 6$	122	0.03
$r_7 = 7$	81	0.02

Solution: s_0 = T(r_0) = (L-1)$\sum_{j=0}^{0} p_r(r_j)$ = (8-1)$p_r(r_0)$ =7*0.19 =1.33

s_1 = T(r_1) = (L-1)$\sum_{j=0}^{1} p_r(r_j)$ = (8-1)[$p_r(r_0)$ + $p_r(r_1)$] =7[0.19+0.25] =3.08

s_2 = 4.55, s_3 = 5.67, s_4 = 6.23, s_5 = 6.65, s_6 = 6.68, and s_7 = 7.00

- The s vales are in fractions as they are generated by summing probability values, so round them to nearest integer.

s_0 =1.33→1	s_1 =3.08 →3	$s_2 = 4.55$→5	$s_3 = 5.67$→6
$s_4 = 6.23$→6	$s_5 = 6.65$→7	$s_6 = 6.68$→7	$s_7 = 7.00$→7