

Image Analysis

Exercise 6

16.10.2003

1. Define the *pseudo color* model A (see Lecture notes) so that the resulting transform will retain the original intensity of the colors. In other words, the Y component of the output image should equal to the gray scale of the input image. Use real values in the range $[0, 1]$. Hint: both the coefficients and the dividing points must be recalculated.
2. The pixels of the 3×3 image sample below belong to two color system (denote by XY -system) and the values range in $[0..15]$. Propose a method for calculating threshold value when the aim is to segment the image according to (a) intensity, (b) color hue. Can the thresholding be applied to each color plane separately?

6, 12	8, 12	9, 8
1, 3	5, 6	9, 6
1, 1	4, 4	6, 4

3. How would you perform *histogram equalization* for the same image if the goal was to increase *saturation* of the image? Apply to the image sample above.
4. Apply *error diffusion* for the image above when the image must be quantized to two colors: (3,3) and (9,9). For simplicity, you can assume that the error is cumulated 50% to the pixel to right, and 50% to the pixel below.
5. Outline how *ordered dithering* could be applied to color images. Explain the similarities and differences to *n-candidate* dithering algorithm [Lemström&Fränti, 2000].