Image Analysis

Exercise 1

11.9.2003

1. CAD-drawing consists of 5000 straight lines each stored by the coordinates (x,y) of the two end points. Every coordinate value is represented by 32 bits. Calculate the storage size if the drawing is stored as: (a) CAD-drawing as such (b) as 1024×1024 binary raster image, (c) as 1024×1024 gray-scale image of 2 bits per pixel, and (d) as 256×256 gray scale image of 8 bits per pixel. Is there any reason to use more than 1 bits per pixel?

2. What colors the following RGB-values represents: (R,G,B)=(0.5, 0.5, 0.5); (0.5, 0.5, 0.0); (0.75, 0.25, 0.0); (0.75, 0.25, 0.25); (1.0, 0.0, 1.0); (1.0, 1.0, 1.0). Convert the colors to YUV-space.

3. What is the output range of YUV components if R,G,B $\in$ [0,1]? Give formulas for YUV $\rightarrow$RGB conversion.

4. Convert the colors of exercise 2 into HSI-space. Illustrate the location of the colors in a 2-dimensional HSI-triangle.

5. Laihia's ice hockey forum has got a new video board, which has two-color system instead of standard three-color RGB system (because of economical reasons of course). The sharp-headed engineers in *CheapSolutions* Ltd. have tried to optimized the image quality by choosing the two colors as Yellow (1, 1, 0) and Cyan (0, 1, 0.5). How the colors of task no. 2 will be shown in this video board?