# Image Processing and Computer Vision 1

Chapter 6 – Color Processing – week 13

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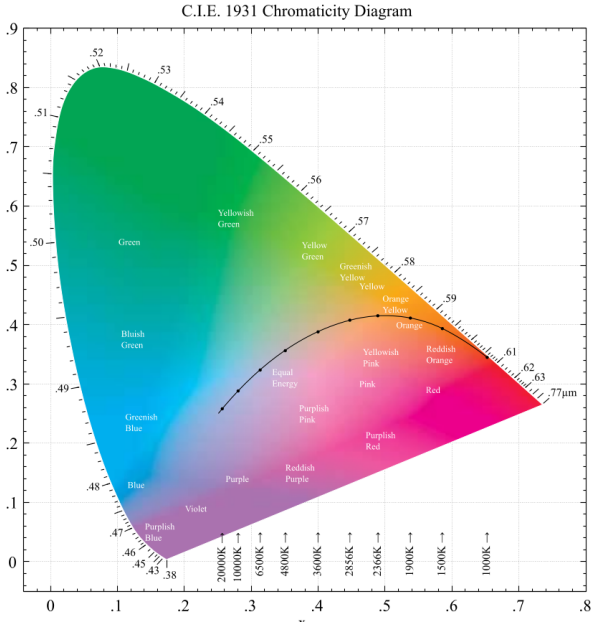
## 1 Book

### 1.1 Book by Gonzalez and Woods, 7.2

Consider any two valid colors $c_1$ and $c_2$ with the coordinates $(x_1, y_1)$ and $(x_2, y_2)$ in the chromaticity diagram of Fig. 7.5. Derive the necessary general expression(s) for computing the relative percentages of colors $c_1$ and $c_2$ composing a given color that is known to lie on the straight line joining these two colors.




Book Fig. 7.5: Chromaticity diagram

### 1.2 Book by Gonzalez and Woods, 7.4

In an automated assembly application, three types of parts are to be color-coded to simplify detection. However, only a monochrome TV camera is available to acquire digital images. Propose a technique for using this camera to detect the three different colors.

### 1.3 Book by Gonzalez and Woods, 7.10

Sketch the HSI components of the image in Problem 7.6 as they would appear on a monochrome monitor.

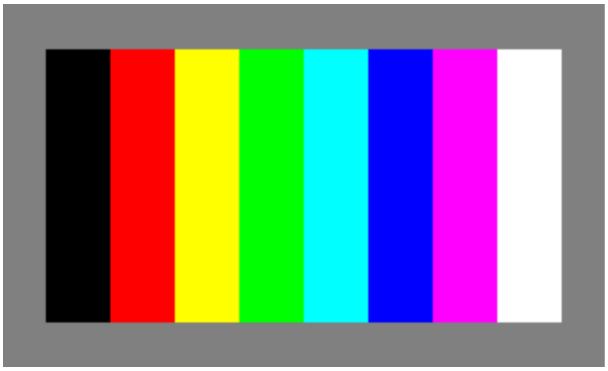


Image of Problem 7.6

## 2 Practical Exercise

Write a program, which converts RGB images to HSI images and vice versa. Now cicularly shift all hues in a given image by 0.5 and display the resulting images. Is the effect what you expected? Also try to circularly shift the saturation and intensity.

## Additional Task

Try to make the above exercise run in real-time, so that you can use it with the lab's webcam. Use the built-in functions `rgb2hsv` (MATLAB) or `matplotlib.colors.rgb_to_hsv` (Python) and their counterparts. Also implement the circular shift of the HSI layers.