

COLOUR IMAGE PROCESSING

Assignment – 1

Due: 7 March 2014

- There are two questions, each of 10 marks.
 - Answer them both.
 - You may discuss among yourselves, but should submit answers in your own words.
1. This question helps understand the relationships between the physical, human vision and digital aspects of colour. Download the file `spectra.ods` from the course webpage. It contains data for four colour spectra sampled at 5 nm in the range 400 nm — 700 nm. Also, download the file `cmm_5nm.csv` containing the colour matching matrix values at 5 nm intervals in the range 400 nm — 700 nm.
 - For each spectrum in the file `spectra.ods`, compute the corresponding (R,G,B) values. Use `gimp` to create a 256×256 image of the (R,G,B) colour for each of the four spectra. Do the colours make sense to you with respect to their spectra? In other words, if a colour appears yellow, do you see that there is a peak in the spectral values in the range 570 nm — 600 nm? Summarise your observations in a few sentences.
 - You will note that the values in each spectrum are in the range 0.00 — 1.00. Compute the *reversed* spectra, i.e., subtract each value of the spectrum from 1.00. If a spectrum has a value of 0.85 at 500 nm, then the reversed spectrum has a value of 0.15 at 500 nm. Compute the equivalent (R,G,B) values for the four reversed spectra. Do you think they should represent the negative (or complementary) colour in (R,G,B) colour space?
 2. Run `ciptk` GUI version and load the image `wplane.ppm`. In the menu labelled *Misce*, you will find an operation called *Hue Polarise*. Select it. Enter the value 95 in the box labelled *Percentage* and the value 3 in the box *No. of Poles*. In the textbox, enter the values 600, 1800, 3000 and press <CTRL-Z>. Perform the operation and see the result. Select the HSV colour model in the box below the displayed image and choose *Histogram for Hue*. Compare the resulting hue histograms for the original and the hue polarised image. What do you think is the operation *Hue Polarise*? Play around a bit more and think of any applications for the operation.