Short description of the HDR data and how it can be used in HDR construction

This description is based on the Szeliski Computer Vision book

Here you find a series of images in tiff format. They contain images of the same scene.

The exposure time increases by a factor of two between two of them.

There is also a Matlab m-file makegfun.m and a matfile gfun.mat. After running makegfun.m or loading gfun.mat you will have a matrix gfun of size 256x3.

This function characterizes the relation between pixel values, exposure time and irradiance (one curve for the R, G and the B channel).

It uses base 2 logarithm as explained in Eq. (10.5) in the book.

Plot the functions and their exponentials: plot(gfun) and plot(2.^gfun)

The exposure times is increased by a factor of two between two images: tj+1/tj = 2 in the notation of the book.

Read in the images; find the point with the highest intensity value in one of the first (darkest) images,

the point with the lowest value in the last (lightest) image and a medium gray point somewhere in image 9.

Selecting the image values (either from one channel or the intensity) at these three positions for all images gives you three sequences of pixel values,

each of them with 14 elements.

Plot these sequences and analyze their behavior.

Use Eqs. (10.4) and (10.5) to convert the original images to the exposure images at the right side of Eq. (10.4)

Pixels with very low or very high values are not reliable (why?) and should therefore be weighted down by the algorithm (see for example Eq. (10.7).

For every image in the sequence create a mask or a weight image describing how this image should be used in the final merging step.

You now have image pairs with values Eitj (from Eq. 10.4) and weights wij

Estimate the values Ei (one for every image in the sequence) and use the weights w to combine them to the final estimated irradiance value hi at position i in the image.

Collect all values hi in the High-Dynamic-Range (HDR) image H

Explore and explain the properties of H. To do this use the following matlab commands (in that order):

imshow, imagesc, imtool (convert to gray scale and load the converted image into imtool) and finally tonemap and imshow

If you want to save the image for further processing use save (if you continue working in Matlab) or hdrwrite if you want to export it to other image processing systems.