LAB 3: DUE 28 OCTOBER 2015

Task 1: Focal Stack (30 pts)

Compute an all-in-focus image from a focal stack. Three images of a focal stack are provided. Compute the magnitudes of their gradients for each pixel in each image. Fuse all three images by picking the pixel value with the highest gradient magnitude among the three. Plot an false color image with the image contributions.

Task 2: HDR (40 pts)

Implement high dynamic range image fusion. You will find four different exposures of the same scene in the 'hdr' folder. These are recorded with different stops as specified in the EV value in the respective filename. The reference stop is 0. A stop of 1 corresponds to an exposure time twice that of 0. Stop 2 exposes the image 4 times as long as stop 0 and stop 4 eight times as long. Stop -1 corresponds to an exposure time half that of stop 0.

a) Load the jpeg images. The images are provided in sRGB space, so you need to apply an inverse gamma curve corresponding to the sRGB to linearize them.

b) Compute the weights using Robertson's method, as listed in the lecture.

ROBERTSON, BORMAN, STEVENSON, "ESTIMATION-THEORETIC APPROACH TO DYNAMIC RANGE IMPROVEMENT USING MULTIPLE EXPOSURES", JOURNAL OF ELECTRONIC IMAGING 2003

c) Save it as an EXR image

d) Try your method with the Memorial dataset.

Task 4: Tone Mapping (30)

Take the code from http://people.csail.mit.edu/sparis/bf/#code and apply their tone mapping operator. Test the result with your image.

Extras

Implement the bilateral filter by your self. The brute force implementation will be very slow, but will help you understanding the method.

Deliverables

Code and images. You will demo it for marking during the next lab.
README file.

- How long did the assignment take?
- Issues and descriptions of your partial solution (for partial credit)
- Any extras?
- Collaboration acknowledgment.
- What was most unclear/difficult?
- What was most exciting?
- How does the bilateral filter work?