MIT CSAIL

6.869 Advances in Computer Vision

Fall 2013

Problem Set 3: Filtering

Posted: Thursday, September 19, 2013   **Due:** Thursday, September 26, 2013

You should submit a hard copy of your work in class, and upload your code (and all files needed to run it, images, etc) to stellar.

Your report should include images and plots showing your results, as well as pieces of your code that you find relevant.

This problem uses pyramid image processing. Download and install the pyramid image processing toolbox by [2]. When forming pyramid decompositions for these problems, you may always use the default decomposition filters.

Problem 1 *Image blending*

(a) Build a Laplacian pyramid of one image and show you can reconstruct back the original image. Code for the Laplacian pyramid is available in the pyramid image processing toolbox.

(b) Implement the function `PyrBlend(im1,im2,mask)` that takes as input two images and a binary mask (determining which part to use from each image) and produces the Laplacian pyramid blend of the two images. Use your function to blend two images of your favorite pets, friends or objects. Include in your report the original images, their Laplacian pyramids, the blending mask, and the resulting blended image.

Problem 2 *Hybrid images*

In this problem you will create hybrid images as described in [1].

Take two images, A and B, that you'll want to have blend from one to the other. Try to make the objects in the two images occupy more or less the same region. Construct a hybrid image from A (to be seen close-up) and B (to be seen far away) as follows:

$$\text{out} = \texttt{blur}(B) + (A\text{-}\texttt{blur}(A))$$

Where `blur` is a function that low-pass filters the image. You can write your own blur function, or use the `upBlur` and `blurDn` functions supplied in [2] (which go up and down

Gaussian pyramid levels). You will want to blur by more than just one Gaussian pyramid level. How does the blurring level affect your perception of the results?

Submit your images, results and code.

References

[1] Aude Oliva, Antonio Torralba, and Philippe G Schyns. Hybrid images. ACM Transactions on Graphics (TOG), 2006. `http://cvcl.mit.edu/publications/OlivaTorralb_Hybrid_Siggraph06.pdf.`

[2] Eero Simoncelli. matlabPyrTools. `http://www.cns.nyu.edu/~eero/software.php.`