

Programming Assignment 2
CS 111: Digital Image Processing (Fall 2016)
Due: October 17, Midnight

Part 1: Low-pass Filtering

Write a program to generate an 8 level Gaussian pyramid using convolution. Use two different approaches to generate the pyramid.

- A. Generate each level of the pyramid by applying a 2x2 box filter to the image in the immediately preceding level.
- B. Generate each level of the pyramid by doubling the size of the box filter and applying it to the original image, which forms the first level of the pyramid.

Compare the results generated from these two approaches.

Part 2: Band-pass Filtering

Write a program to generate 7 levels of the Laplacian pyramid by subtracting the consecutive levels of the Gaussian pyramid. Use the pyramid you created in part 1B for this.

Part 3: Edge Crispening

Photographs with crisper edges are often subjectively pleasing than exact photometric representation. One way to achieve edge crispening is to apply high pass filtering to an image and adding the high frequency image to the original image. Use the following two approaches for high-pass filtering the image.

- A. Subtract every level of the Gaussian pyramid from level 1 and get 7 levels of high-pass filtered images. Use the pyramid you created in the part 1B for this.
- B. Subtract the low pass filter created in every level of 1B to form a high pass filter. This will give you a set of high pass filters of different widths. Apply them to the image to create a hierarchy of high pass filtered images.

Generate a pyramid of edge-sharpened images by adding the original image to each image in the hierarchy.

Compare the two different image hierarchies. For more information check

http://www.idlcoyote.com/ip_tips/sharpen.html

Deliverables

Please submit all your code and the results of applying your code to **ALL** the images in the image library in the dropbox on EEE.

1. The structure of the zip file should be:
e.g.
your_name.zip -> code: (attach all the code here)
 ->images1: ->different folder for each part.
 ->images2: ->different folder for each part.

 ->images5: ->different folder for each part.