CS 580/BME429: Homework Set #3 Fall 2007

Due Wednesday, Oct. 17 by 3:10 PM

Hand in your work via email to TA: Zhen Qian (zqian@eden.rutgers.edu).

1. Create a gaussian 1D distribution, calculate the 1st and 2nd derivatives and find the zero-crossings. Show the three plots and the zero-crossings values. What do you observe?

2. Load an image (any image), convert it into grayscale (0…1) and:
   (i) Compute the image gradient.
   (ii) Get a row (any row) from the image and plot it (intensity values)
   (iii) From the same row, plot the corresponding gradient
   (iv) Filter the image with a Gaussian mask and repeat (i)-(iii). What do you observe?

3. Load an image (any image), and:
   (i) Smooth the image with 3x3, 7x7 and 15x15 Gaussian masks. What do you observe (edges).
   (ii) Add noise to the initial image: gaussian and salt & pepper. Show the corresponding images.
   (iii) Filter the resulting noisy images with boxcar and Gaussian masks. Show the results.

4. Load an image (any image), and:
   (i) Detect edges using three different methods ‘sobel’, ‘zerocross’ and ‘canny’.
   (ii) Compare these three different kinds of edge detectors.

5. Load an image (any image), and:
   (i) Plot its histogram.
   (ii) Erode and dilate the image with different structure elements with different sizes.

For all questions you may use either built-in functions of Matlab or create your own functions.

Built-in functions (see help): normpdf, conv, diff, gradient, rgb2gray, imnoise, filter2.