CS6550 Computer Vision
Homework # 1: Feature Extraction
Due: 11:59pm, 10/17/2012

I. (50%) Perform the following steps sequentially to the two images below for edge detection. Write each of the following steps as a separate function and show the step-by-step results.
   A. Perform the Gaussian smoothing of different scales (σ =1, 3)
   B. Apply the Sobel operators to the above Gaussian smoothed images
   C. Compute the gradient magnitude images from the previous steps
   D. Perform non-maximal suppression with appropriate gradient thresholding for edge detection


II. Detect the corners of the above two images by using the Harris corner detector. Perform the following step-by-step procedure:
   A. From your results in problem I.B, i.e. Sobel gradient images, compute the Harris matrices A of two different scales. Show the images of the smaller eigenvalue for the two scales, respectively.
   B. Compute the corner response function R at all pixels and show the results for the two scales.
   C. Perform non-maximal suppression for the corner response function in conjunction with appropriate thresholding for corner detection
   D. Apply the above two variants of Harris corner detection to the rotated and zoomed versions of the two images.
   E. Try to compare the consistency of the detected corners on these two pairs of images.