ECE4580 Homework #11

Due: Apr. 03, 2014

Problem 1. (25 pts) Fill out the code stubs for `findHarrisPts.m` and `runHarris.m` so that `runHarris` will work when run and correctly plot the points in the image the pass the Harris corner detector specifications. The code loads the `edges01.mat` Matlab file, which contains the campus and TSRB images. Apply the detector to these images.

For the Harris corner detector, the score to threshold is the product of the eigenvalues minus a fraction of the square of the sum of the eigenvalues,

$$score = \lambda_1\lambda_2 - \kappa(\lambda_1 + \lambda_2)^2 = \det(G) - \kappa\left(\text{trace}(G)\right)^2,$$

where G is the 2×2 matrix from the notes. It is generated from the integral of the matrix $[\nabla I \, \nabla I^T]$ over a window of the image. In the code, I actually request that rather than integrate, you average over the window. Using an averaging filter normalizes the output to some degree, so that the thresholds don't vary with the area of the window size.

Turn in your code with one of the `edges01.mat` images selected. As part of the documentation, turn in one image with the feature points plotted on it. Explain why you chose this particular image and the parameter settings that generated the feature points. Also turn in a brief discussion of your experiences applying the corner detector to the images. What does it find? What does it not find? How well does it match up with your expectations?

Problem 2. (35 pts) Each group has a baby step to perform for the following Thursday. Your are to complete that baby step and report to the group contact. You should roughly reiterate the baby step, discuss how it was accomplished, demonstrate through images (if possible) functionality, then briefly note any observations (including cases where it may not work so faithfully, or what is needed to work very well). If your project involves video and cannot be demonstrated with still images, then present it to your group contact by Friday (but still turn in everything else with the homework). This means you should be done by Thursday, but there is a grace period for presenting things should that be needed. It is up to you and your contact to figure that out.