ECE 661 Homework 3

Due: 10/02/2008 Thursday (before the class)

The goal of this homework is to learn how to use NCC (Normalized Cross Correlation) and SSD (Sum of Squared Difference) to match landmark features in one image with similar features in another image of the same scene that is not registered with the first image. This homework requires you to use corners as landmark features. Additionally, you must use the Harris algorithm for corner detection. The homework also requires you to take two images of the same scene that have small differences of rotation and translation between them. For example, see Figure 4.9 (a) and (b) in the textbook.

You must try to find corresponding landmarks using both matching mehtods mentioned above and select the appropriate value of the relevant parameters, such as the size of windows for the Harris corner detects and for NCC and SSD and the threshold for matching, in order to obtain the best result. Your solution should show which points are extracted and matched between the two images by highlighting them with points and lines. The format of the output display should be as shown in the figure on the back side of this page. You can use the function 'cvLine' from openCV library to draw the straight lines in the display. Feel free to look at the solution of the Harris corner detector and NCC posted at 'cobweb.ecn.purdue/~kak/courses-i-teach/ECE661/index.html', but the code you turn in must be your own.

Show your results on a pair of images downloaded from 'web.ics.purdue.edu/~kim497/ece661/homework.htm' and two pairs of images from your own camera.

Notes.

- Clearly identify the steps you have taken to solve the problem with your own words.
- Your grade depends on the completeness and clarity of your work as well as the result.