Comp. 4900D: Assignment #3
Due: Tuesday March 22, 2011

1) There are two programs for you to write. The first one should have four arguments: <input image filename> <input correspondence filename> <output image filename> <output warp matrix>. The input correspondence file has four lines, each with from x, from y, to x, to y, pixel values for each of the four correspondences. You should use these correspondences to create a perspective warp matrix, and then apply this matrix to the input image to create a new output image, that should be written to the ouput image filename. This program should use only the routines defined in Opencv to compute the perspective warp (cvGetPerspectiveTransform and cvWarpPerspectiveTransform, do not write your own routines here) and should also output the 3 by 3 perspective warp matrix. The input correspondence file and the input image file can be obtained from the course web site. **2 marks**

2) The second program will have two arguments: <input correspondence file> <output warp>. It takes the same four correspondences as defined above, and uses them to compute the perspective warp matrix. However, this time you will write the program that computes this warp as defined in the notes, do not use any of the OpenCV routines to compute this warp (other than the SVD routine). You also do not need to apply the computed warp to an image, just output the new 3 by 3 warp matrix. Your new warp matrix should be the same as the one that was computed in question 1. However, please remember to normalize the warp matrix by dividing every element by h(3,3) – that is make the last element equal to 1. **3 marks**

3) Often a warp is applied to an input image to create what is called a rectified image. What is the definition of a rectified image? Give one reason why someone would want to create a rectified image? **1 mark**

4) Does a perspective image warp preserve straight lines, and does it preserve parallel lines (there are 2 questions)? In other words, is it true that when a perspective image warp is applied to an image with straight/parallel lines, then the same line in the warped image will also be straight/parallel? **1 mark**

5) If we wanted to invert the warp, that is to apply it to the output image to create the input image, what is the simplest way that this can be accomplished? **1 mark**

6) There is a security camera which is rotating, and in doing so has tracked a person walking along the outside of a building in a video sequence. You want to remove all traces of that person from the video; that is to create a new video which is the same as the old one, but has the person missing. List the steps to accomplish this task. Hint: you will use perspective warping. **2 marks**