

ECE 661: Homework 2

Due September 21st

Problem:

The main goal of this homework is to write a computer program that corrects for the projective and affine distortions in an image. As discussed in class there are two methods for doing this.

1. A two-step method. First two sets of parallel lines are used to remove the projective distortion. Second, two sets of orthogonal lines are used to remove the affine distortion.
2. A single step. Five sets of orthogonal lines are used to determine the dual conic C_{∞}^* from which the homography can be determined. This method is very sensitive to the choice of lines and so some tweaking of the lines may be required to get a good result.

Once you've computed the homography your code from the first homework can be used to rectify the image. Since both methods only correct the image up to a similarity transformation the final output may be rotated compared to a world coordinate system.

Solution:

You should turn in a report in pdf format of your homework solution using electronic turn-in. The report should include:

1. A brief outline of both solution methods including the relevant equations.
2. The original and transformed images obtained using both the two step method and the single step C_{∞}^* method on 4 images taken from
http://engineering.purdue.edu/ece661/homework/ECE661_hw1_images.zip

3. The original and transformed images obtained using both the two step method and the single step C_{∞}^* method on 2 images taken with your own camera. Don't forget that the scene should be mostly planar and the original images should show significant perspective and affine distortion.
4. Your source code.

You are permitted to look at sample solutions from previous semesters available at
<http://cobweb.ecn.purdue.edu/~kak/courses-i-teach/ECE661.08/index.htm>
However, the work you turn in must be your own!