

Computer Vision

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M2R MoSIG option GVR

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Lesson 2

Exercises

Estimate the Homography from Scene to Image

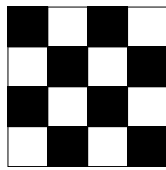
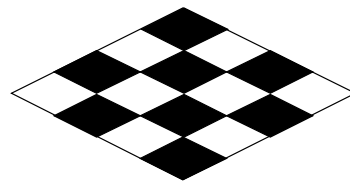


Image S: Calibration Pattern



The image I: Image as seen from Camera

A checkerboard pattern (S) can be used as a calibration grid for estimating a homographic transform to another plane. Explain how to estimate the homographic transform H_S^I from the pattern (S) to an image (I) given the observed position of the corners in image (I).

How can you solve the over-constrained system of 50 Equations? Is the result better with 8 or 50 equations? Can any subset of 8 equations be used?

hint:

- assume locations such that the lower corner is the origin, and the size of the grid is 4×4 . (whatever units you like).
- assign labels to these points so that the lower left corner is $k=0$, and the upper right corner is $k=24$.
- Write the equations for scene coordinates x_k and y_k as a function of observed image positions i_k and j_k and the coefficients of H_S^I .
- Transform the equations to a linear form, and factor out the h coefficients.
- Set up a system of simultaneous equations and describe how to solve when you have exactly 8 equations, and when you have all 50 equations.