

Removing Projective Distortion from Images

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1 Homogenous Coordinates

Similar to cartesian coordinates, homogenous coordinates are a way to represent points in a given dimension.



(a) Cartesian \mathbb{R}^2

(b) Homogenous \mathbb{R}^2

Figure 1: Representing coordinates as homogenous and cartesian

The only practical difference between cartesian and homogenous for the purposes of this assignment is that homogenous coordinates contain an extra dimension value that represents vector scaling. This allows a point to be further from the origin on its component vector without altering the other coordinates.

2 Projective Transformations

Projective Transformations

- General projective transform (or Homography)

$$\begin{bmatrix} x' \\ y' \\ 1 \end{bmatrix} \cong \begin{bmatrix} wx' \\ wy' \\ w \end{bmatrix} = \begin{bmatrix} a & b & c \\ d & e & f \\ g & h & i \end{bmatrix} \begin{bmatrix} x \\ y \\ 1 \end{bmatrix}$$
- Preserves:
 - Lines
 - Also cross ratios (maybe later)

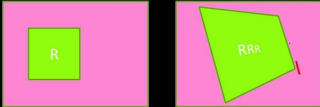


Figure 2: HDSFKJHDF

$$\begin{pmatrix} a & b \\ c & d \end{pmatrix}$$