

Computer Vision

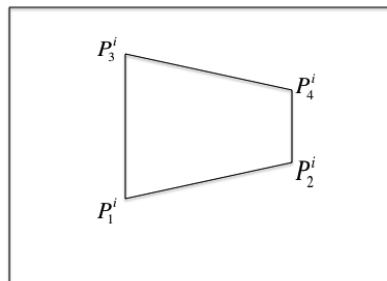
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Exercise on Projective Transformations



You are provided with an image that contains an oblique view of a screen. An image analysis system has provided you with the image coordinates of the four corners of the screen: $\{P_1^i, P_2^i, P_3^i, P_4^i\}$ where P_1^i is the lower left corner, P_2^i is the lower right corner, P_3^i is the upper left corner, and P_4^i is the upper right corner. Assume that the screen has a coordinate system with the lower left corner as the origin, the line $P_1^i P_2^i$ as the horizontal (x) axis and $P_1^i P_3^i$ as the vertical (y)

axis. In screen coordinates, S: $P_1^S = \begin{pmatrix} 0 \\ 0 \\ 1 \end{pmatrix}$, $P_2^S = \begin{pmatrix} 1 \\ 0 \\ 1 \end{pmatrix}$, $P_3^S = \begin{pmatrix} 0 \\ 1 \\ 1 \end{pmatrix}$, $P_4^S = \begin{pmatrix} 1 \\ 1 \\ 1 \end{pmatrix}$.

Show how to compute the homographic transformation H_i^S that can transform image positions, P^i onto screen positions, P^S : $P^S = H_i^S P^i$