Automated Anamorphic Projections on Planar Surfaces

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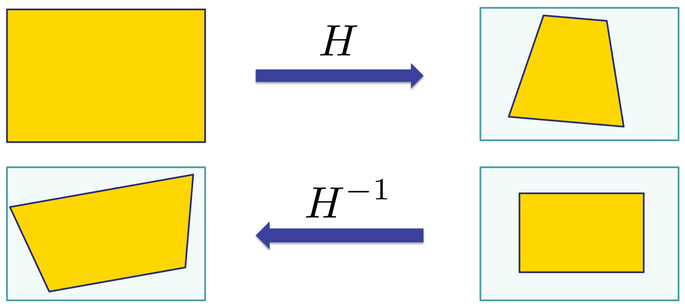
Introduction

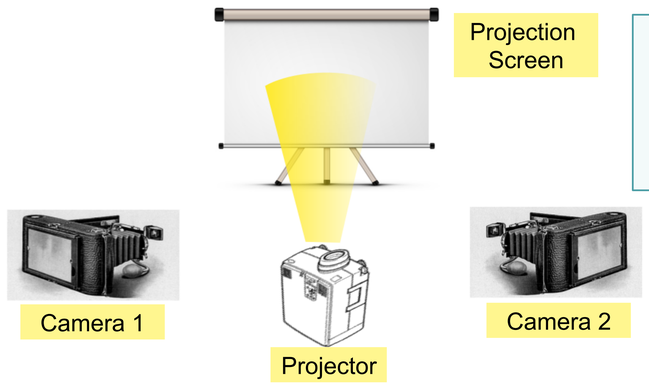
Homography

Projector Image ***Camera Image***

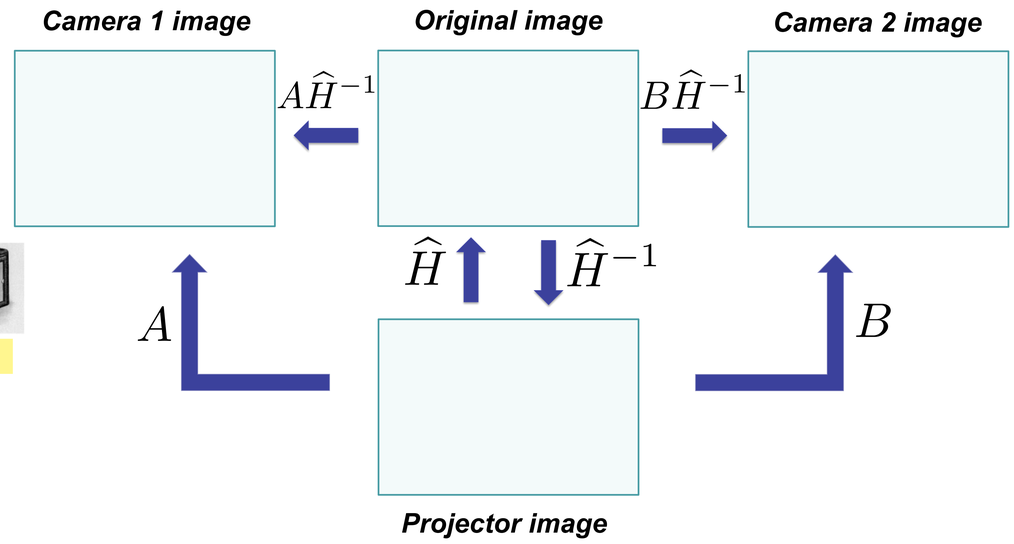


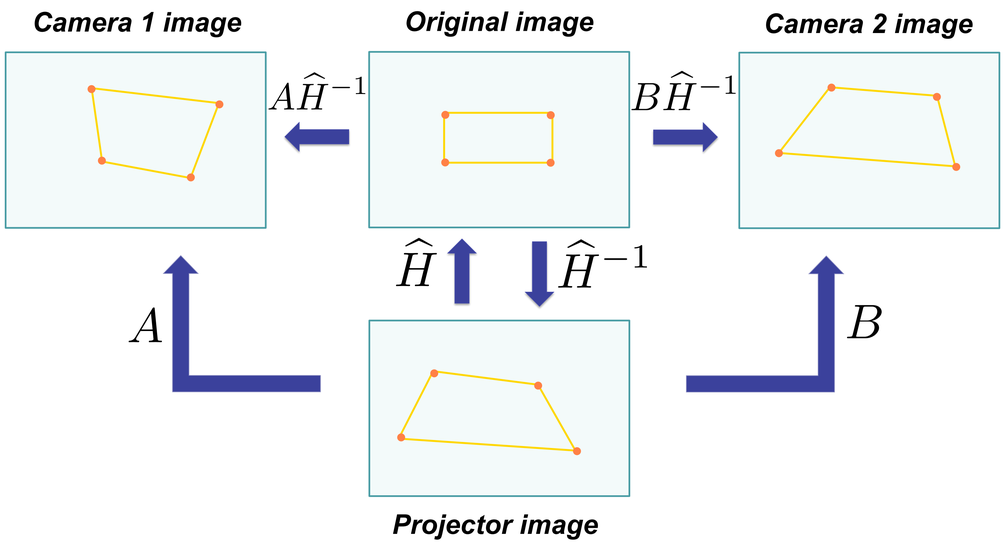
$$H = \begin{pmatrix} p_1 & p_2 & p_3 \\ p_4 & p_5 & p_6 \\ p_7 & p_8 & p_9 \end{pmatrix} \qquad H \begin{pmatrix} x \\ y \\ 1 \end{pmatrix} = \begin{pmatrix} x' \\ y' \\ \omega \end{pmatrix}$$

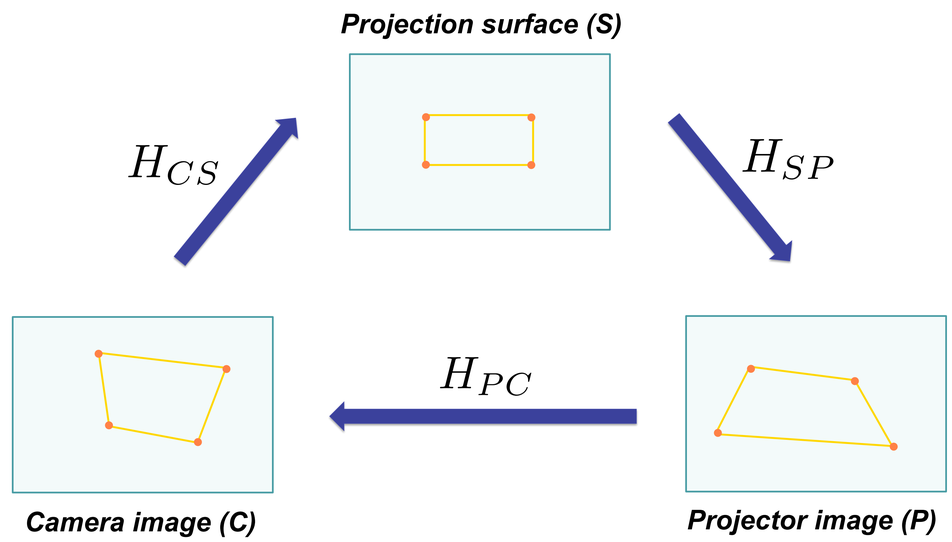
Experimental Setup



Two-View Model







A **homography**, or projective transformation, is a transformation of a two-dimensional image I to another two-dimensional image I' (called the anamorphic image), such that all lines in I are preserved in I'.

Sukthankar, R., et al**. Smarter Presentations: Exploiting Homography in Camera-Projector Systems**. International Conference on Computer Vision, 2001.

The error function:

$$E = \sum_{i=0}^{n-1} \|Hp_i - q_i\|^2$$

n – number of point correspondences
H – projector-camera homography
p_i – original chessboard corners
q_i – chessboard corners detected in the camera image

Future Work

- Generate anamorphic images that can be projected on more complex surfaces such as multi-planar and curved surfaces.
- Improve the optimization for multiple-viewer system.
- Explore other types of anamorphosis such as mirror anamorphosis.