

Finding plane induced homography using RANSAC

The algorithm is outlined in chapter 13, p.315 in Multiple View Geometry.

1. Track strong features in image, supposedly with FAST + KLT.
2. Compute fundamental matrix F using the function `cvFindFundamentalMat`. (The eight-point approach is probably gives the best trade-off between accuracy and speed.)
3. Choose three point correspondences $x' \leftrightarrow x$ at random, compute the corrected correspondences using the algorithm described on p.218 in Multiple View Geometry. (Can possibly be left out to increase efficiency.)

Compute homography $x' = Hx$ induced by the assumed plane. \Rightarrow

4. Choose $A = [e']_x F$ where e' is the epipolar point of the second view. (e' given as the left null vector of F , i.e. $e'^T F = \mathbf{0}$)
5. Solve linearly for \mathbf{v} from the equation $M\mathbf{v} = \mathbf{b}$, where

$$M = \begin{pmatrix} \mathbf{x}_1^T \\ \mathbf{x}_2^T \\ \mathbf{x}_3^T \end{pmatrix}, \quad b_i = \left(\frac{(x'_i \times (Ax_i))^T (x'_i \times e')}{(x'_i \times e')^T (x'_i \times e')} \right).$$

Be sure to use the `cvCrossProduct` function!

6. We now have $H = A - e'\mathbf{v}^T$.
7. Select other points to check if the assumption $x' = Hx$ holds, geometric error is probably a useful measure. If it holds for a point x it is added to the set of inliers, otherwise added to the set of outliers. If enough inliers are registered we use all of them to calculate one final plane. (This could also be done during the phase where we check new points, i.e. we continually calculate a new plane based on found inliers)
8. Implement correction mentioned in the section **Estimation from noisy points** on p. 332.