

3B-L2 Epipolar geometry

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1. Sum

a. epipolar constraints

- i. points in one epipolar line must correspond to another in the other epipolar line
- ii. The epipolar constraint reduces the correspondence problem to a 1D search along an epipolar line.

2. Intro

- a. constraints to help find the corresponding points

3. Stereo Correspondence Constraints

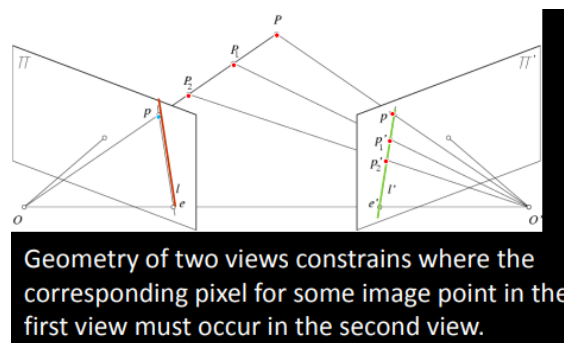
a. calibration of camera

- i. parallel optical axis -- simplest
- ii. verged -- as human vision system 相交于一点
- iii. unmerged -- 几乎不用

- b. Epipolar geometry is the geometry of stereo vision.

c. Stereo correspondence constraints

- i. (For verged cameras,) the line containing the center of projection and the point P in the left image must project to a line in the right image.



Geometry of two views constrains where the corresponding pixel for some image point in the first view must occur in the second view.

4. Terms (ref to the figure above)

- a. Baseline: line joining the camera centers
- b. Epipolar plane: plane containing baseline and world point
- c. Epipolar line: intersection of epipolar plane with the image plane - come in pairs
 - i. points in one epipolar line must correspond to another in the other epipolar line
- d. Epipole: point of intersection of baseline with image plane
 - i. every epipolar line passes the epipole.
 - ii. normally the image plane is too small to show the epipole. But it can be mathematically constructed off the image plane

5. Epipolar Constraint

a. the meaning

- i. The epipolar constraint reduces the correspondence problem to a 1D search along an epipolar line.

6. Converging Cameras

- a. epipolar lines intersect at epipole.



7. Parallel Image Planes

- a. epipolar lines are parallel and they intersect at the infinity.

