Epipolar Geometry In Stereo Motion And Object Recognition A Unified Approach Computational Imaging And Vision

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Epipolar Geometry In Stereo Motion

Basic Stereo & Epipolar Geometry
• Epipolar Plane! • Epipoles e 1, e 2! • Epipolar Lines! • Baseline! O 1! O 2! x 2! X! x 1! e 2! = intersections of baseline with image planes ! = projections of the other camera center! = vanishing points of camera motion direction! Epipolar Geometry 42 Slide source: S Savarese! How do we represent the epipolar geometry algebraically?!
Stereo and Epipolar geometry
1 Stereo and Epipolar geometry Jana Kosecka 2 Previously Image Primitives (feature points, lines, contours) Today: How to match primitives between two (multiple) views) Goals: 3D reconstruction, recognition Stereo matching and reconstruction (canonical configuration) Epipolar …
Epipolar Geometry in Stereo, Motion and Object Recognition
Epipolar Geometry in Stereo, Motion and Object Recognition A Unified Approach by GangXu Department of Computer Science, Ritsumeikan University, Kusatsu, Japan

Epipolar Geometry and Stereo Vision - Virginia Tech

Basic stereo matching algorithm •If necessary, rectify the two stereo images to transform epipolar lines into scanlines •For each pixel x in the first image •Find corresponding epipolar scanline in the right image •Search the scanline and pick the best match x' •Compute disparity x-x' and set depth(x) = fB/(x-x')

Epipolar geometry & stereo vision

• Epipolar geometry and the epipolar constraint – Case example with parallel optical axes – General case with calibrated cameras Geometry for a simple stereo system • First, assuming parallel optical axes, known camera parameters (ie, calibrated cameras):

Stereo Wrap Up and Structure from Motion

Uncalibrated stereo • Epipolar geometry can be determined without calibration • Images can be rectified so epipolar lines are rows of the rectified image • Matching can proceed in the same way • But you need calibration to estimate depth However, if you arbitrarily make …

Epipolar Geometry, cameras Feature Detection,

Epipolar Geometry All points on π project onto epipolar lines l and l´ Epipolar Geometry Family of planes π and lines l and l´ intersect in epipoles e and e´ Epipolar Geometry epipoles e, e´ = intersection of baseline with image plane = projection of optical center in other image = …

Planar Catadioptric Stereo: Geometry and Calibration

dioptric stereo with two planar mirrors and show how the relative orientation, the epipolar geometry and the estima- tion of the focal length are constrained by planar motion In addition, we have implemented a real-time system which demonstrates the viability of stereo with mirrors as an al- ternative to traditional two camera stereo

Epipolar Geometry and the Fundamental Matrix

Epipolar Geometry and the Fundamental Matrix The epipolar geometry is the intrinsic projective geometry between two views It is independent of scene structure, and only depends on the cameras' internal parameters and relative pose The fundamental matrix Fencapsulates this …

Epipolar Geometry and the Fundamental Matrix

222 8 Epipolar Geometry and the Fundamental Matrix e at infinity e at/ infinity a bc Fig 84 Motion parallel to the image plane In the case of a special motion where the translation is parallel to the image plane, and the rotation axis is perpendicular to the image

Image Processing 3. Stereo & Structure from Motion

Image Processing: 3 Stereo & Structure from Motion Aleix M Martinez aleix@eceosuedu More than one camera (or image) •In many applications, we can make use of more than one camera or of a sequence of images •These two problems are very similar (although not identical) •In this section, we will develop the fundamental

Epipolar Geometry

Multi-view geometry problems Camera 3 R 3,t 3 Camera 1 R Camera 2 1,t 1 R 2,t 2 Slide credit: Noah Snavely Stereo/Epipolar Geomery: Given 2 cameras and find where a point

3 3 epipolar - University of Washington

The Epipolar Constraint • For rays to intersect at a point (X), the two rays and the camera translation must lie in the same plane 9 310 Appendix A Multiple View Geometry 129 Figure A5: The epipolar constraint expresses the fact that the two camera centres

Computer Vision Lecture 15

g18 Stereo Correspondence Constraints • Geometry of two views allows us to constrain where the corresponding pixel for some image point in the first view must occur in the second view • Epipolar constraint: Why is this useful? Reduces correspondence problem to …

Epipolar Geometry and the Fundamental Matrix

242 9 Epipolar Geometry and the Fundamental Matrix e at infinity / infinity a bc Fig 94 Motion parallel to the image plane In the case of a special motion where the translation is parallel to the image plane, and the rotation axis is perpendicular to the image plane, the intersection

3D Photography: Epipolar geometry - CVG @ ETHZ

3D Photography: Epipolar geometry Kalin Kolev, Marc Pollefeys Spring 2013 = vanishing point of camera motion direction an epipolar plane = plane containing baseline (1- D family) converging cameras Example: motion parallel with image plane (simple for stereo → rectification)

Epipolar Geometry for Humanoid Robotic Heads

Epipolar Geometry for Humanoid Robotic Heads 25 In a stereo vision system, epipolar geometry describes the projective rela-tionship between two camera views, and can either be computed from their calibration [5], or estimated for uncalibrated cameras via methods such as the 8-point algorithm [6] In the case of calibrated cameras, the epipolar

Epipolar-Plane Image Analysis: An Approach to Determining …

Epipolar-Plane Image Analysis 9 Fig 1 Lateral motion horizontal scan lines, or rows, in the images Therefore, we gathered a second sequence of images moving right to left along the track, as shown in figure 1 Figure 2 shows the first and last images from this sequence of 32

scene point image plane focal point

epipolar plane epipolar line epipolar line Correspondence and Optical Flow Stereo requires just 1D motion estimation But in general the motion field is 2D • Epipolar lines not known in advance • Non-rigid motion (no epipolar lines) True motion field: projected point displacements Optical flow is …

Chaplin, Modern Times, 1936

Epipolar geometry Dense depth x K > R t@ X Multi-view geometry problems • Camera ‘Motion’: Given a set of corresponding 2D/3D points in two or more images, compute the camera parameters Camera 1 R Camera 2 Camera 3 1,t 1 R 2,t 2? ? R 3,t 3? Slide credit: Noah Snavely Multi-view geometry problems • Stereo correspondence: Given