CSCI 497P/597P: Computer Vision

Plane Sweep Stereo
Projective Geometry

Announcements

- Exam is due tonight at 10pm.
  - Slip days do not apply - no late exams accepted!

- P3: Plane Sweep Stereo
  - out tomorrow
  - due 11/16
  - can work in pairs again

Goals: Plane Sweep Stereo

- Understand and be prepared to implement the plane sweep stereo algorithm

Goals: Projective Geometry (Today through Friday)

- Understand how lines are represented in projective space.
- Understand the duality of points and lines:
  - How to calculate the line through two points
  - How to check whether a point lies on a line
- Understand the derivation and significance of:
  - The Epipolar plane, epipolar lines, epipoles
  - The fundamental matrix
- Get a general sense for how camera parameters ([R|t], K) can be inferred from sets of feature matches.
- Know the definition of "structure from motion"

A Stereo Algorithm

1. ## For every pixel (x, y)
   1. ### For every disparity d
      1. Get patch from image 1 at (x, y)
      2. Get patch from image 2 at (x + d, y)
      3. Compute cost using your metric of choice

```
C = np.array(h,w,d)
for r in range(0,h):
  for c in range(0,w):
    for d in range(-maxd, maxd):
      C[r,c,d] = metric(get_patch(im1,r,c), get_patch(im2,r,c+d)

disp = np.max(C, axis=2)
depth = f * b / disp
```

Plane Sweep Stereo Algorithm

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