CMPUT 428: Visual Servoing

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1 Lecture - Feb 8

lec10VisServEmbVid.pdf

1.1 Vision Based Control (Visual Servoing)

Robot acting in Euclidean space, gonna be in some manifold of projective space.
4 points give homogrpahy, homography not necessarily euclidean, leverage the fact that the top is in euclidean space, . . .
If full motion isnt convex, there exists some subdivision of motion that is convex → intermediate goal points w/ convex subsections of motion.

1.2 Problems

Chaining transforms → accumulate errors

1.3

Use broyden's method for optimization (dont need to calc. deriv.)
error $y = f(x)$ is visual error, assume it is smooth convex func.
Getting Jacobian: can always get discrete deriv (ie. deriv b/w frames in optical flow)

> move joint 1 (up to 10°), get all partial derivs for joint

> do same for other joints

> fill in jacobian

1.4 Find J Method 2

For every motion, jacobian should obey "secant constraint"

> get 'constraints' from joint motion

> stack into matrix, fit J

1.5 Find J Method 3

Recursive Secant constraints
iterative secant update for jacobian (Broyden)

1.6 Specifications

image encoding $E(y) = 0$
Guarantee that you're actually solving the problem (ie. objects are actually touching and don't just look like they are due to perspective)
(task ambiguity)

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