active contour models
object contours

image manipulation

medical image processing

object tracking
general idea

- start with input image + initial contour
- evolve contour to lie along “important” features
  - edges
  - corners
  - etc.
contour evolution
case study: corpus callosum
active contour

[Davatzikos and Prince]
case study: corpus callosum

conclusion: males have a larger corpus callosum
user perspective

- initialization
- curve properties (continuity, smoothness)
- image features (edges, corners, etc.)
- global forces (repulsion, attraction, etc.)
computational approach

- derive on board...
active contour with corners

\[ \beta(s) = 0 \]
edge affinity

$|\nabla I(x, y)|$
spring constraint forces
issues with boundary reps
greedy evolution
http://www.markschulze.net/snakes/index.html
FIG. 7. Box. (a) Original contour, (b) Kass method, (c) Dynamic programming algorithm, (d) Greedy algorithm.
balloons

neighborhood too small

stuck at local minima

with inflationary force

[Cohen 91]
Figure 10: NMR image. Evolution of the balloon curve to detect the left ventricle.

[Cohen 91]
color affinity

add energy term for constant-color regions of a single color

[Davatzikos and Prince]
brain cortex segmentation

conventional snake result

[Davatzikos and Prince]
brain cortex segmentation

find features; add as constraints
brain cortex segmentation

[Davatzikos and Prince]
multi-scale processing