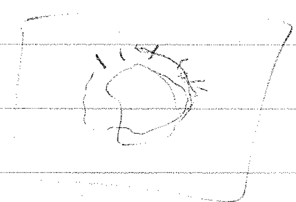
Recap →
- thresholding
- p tile
- multimodal thresholding
- K means ⟷ (diff from EM)
- Edge filtering
→ Hough transform
→ Region based segm.
→ Energy minimization

Energy =

$$E = E_{image} + E_{internal}$$

$$\alpha(p)\frac{\partial C}{\partial p} + \beta(s)\frac{\partial^2 C}{\partial p^2}$$

- Choose an initial guess contour, uniformly sample it —
$v(p)$



$$E_{image} = \int -\|\nabla(G * I)(C(p))\|^2 + I(C(p))$$

$$\frac{1}{1+\|\nabla(G*I)\|^2}$$ white region

$$E_{img} = g(I(C))$$

→ $\beta(x,y)$ attractive region

Elasticity

$$E_{int} = \int \alpha(p)\|C_p\|^2 + \beta(p)\|C_{pp}\|^2$$

Stiffness

$$\frac{\partial L}{\partial C} - \frac{\partial}{\partial p}\frac{\partial L}{\partial C_p} + \frac{\partial^2}{\partial p^2}\frac{\partial L}{\partial C_{pp}}$$

~~Arc~~ Applying this

E-L

$$\nabla_C E = \nabla g - \frac{\partial}{\partial p}\left[2\alpha(p)\, C_p\right] + \frac{\partial^2}{\partial p^2}\left[\beta(p)\, C_{pp}\right] = 0$$

Min. by gradient descent

$$\frac{\partial C}{\partial t}(p,t) = -\gamma \nabla_C E$$

$$C^{n+1} = C^n - \gamma \nabla_C E$$ - converges to local minimum if γ small enough

written as a PDE

Not geometric: ~~param~~ parametrization varies with the curve.

Arc length param: $C(s)$ so that $0 \to L$. $\left\|\frac{\partial C}{\partial s}\right\| = 1$ all the time

~~$ds = \|C_p\|\, dp$~~

$$\frac{\partial C}{\partial s} = \frac{dC}{dp}\frac{dp}{ds}$$

Taking $\|\ \|$

$$\left\|\frac{\partial C}{\partial s}\right\| = \left\|\frac{dC}{dp}\right\| \frac{dp}{ds}$$

$$\boxed{ds = \|C_p\|\, dp}$$