Snake's Algorithm

1. Theory

Snakes Algorithm using active Edge contour model:

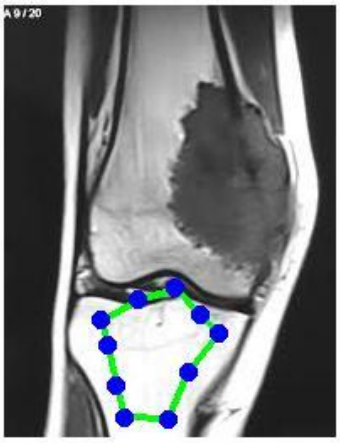
To detect the edges we traditionally followed the canny edge detection algorithm by using the image derivatives of gray-scale image. In snakes algorithm we try to move snake in a direction where energy is minimum.

$$
\begin{aligned}
E^*_{snake} &= \int_0^1 E_{snake}(\mathbf{v}(s))ds \\
&= \int_0^1 E_{int}(\mathbf{v}(s)) + E_{ext}(\mathbf{v}(s))ds \\
&= \int_0^1 E_{int}(\mathbf{v}(s)) + E_{img}(\mathbf{v}(s)) + E_{con}(\mathbf{v}(s))ds.
\end{aligned}
$$

- Initialization of contour points.
- The behavior of the snake is caused by an external energy term that in this case determines that the snake feels attracted to object boundaries.
- Snakes are energy minimizing splines that simulate the behavior of closed springs rolling downhill on a hilly terrain.
- The internal energy is modeled in terms of the derivatives of the curve.
- Contracting behavior corresponds to the minimization of first derivatives while the thin
- Plate behavior that avoids sharp bends is modeled as the minimization of second derivatives.

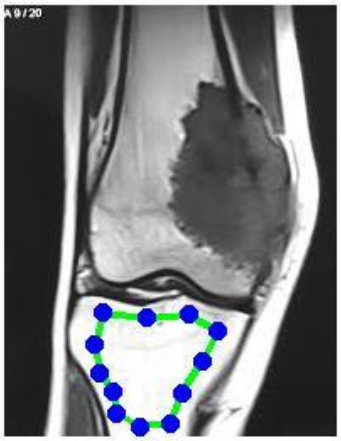
2. Results

Initial snake



Iteration number: 1000

Initial snake



Iteration number: 1000

Initial snake

Iteration number: 1000

3. Problems

- The Algorithm is giving perfect outputs for simple figures but for the complex images like of Bone, snakes are not contracting to actual required contour.
- Dependent on contour initialization points in terms of Number and Location.
- Not works perfectly even for binary images.