Exercise for MA-INF 2201 Computer Vision WS17/18
13.11.2017
Submission on 19.11.2017

1. Read the images `ball.png` and `coffee.png` and segment the object in both images using snakes. To this end, initialize the snake by a circle around the object and optimize the snake using dynamic programming. During optimization one of the nodes should be kept fixed and the elastic energy should penalize deviation from the average distance between pairs of nodes. Visualize for both images how the snake converges to the boundary of the object.

   (10 Points)

2. Read the images `ball.png` and `coffee.png` and segment the object in both images using level-sets with geodesic active contours. To this end, initialize the contour by a circle around the object and compute a signed distance transform to initialize the level-set function. Optimize the geodesic contour by gradient descent. Visualize for both images how the level-set function changes and how the contour converges to the boundary of the object.
   The proposed metric in geodesic active contours is:

   $$w(|\nabla I|) = \frac{1}{|\nabla I| + 1}$$

   Hint: A lot of iterations are needed for this method. You should expect aprroximately 13000-17000 iterations and 2-3 minutes of runtime per image. Update the visualization at every $100th$ iteration to avoid a potential speed-bottleneck.

   (10 Points)