

CHAPTER 4: IMAGE SEGMENTATION USING THE LEVEL SET METHOD

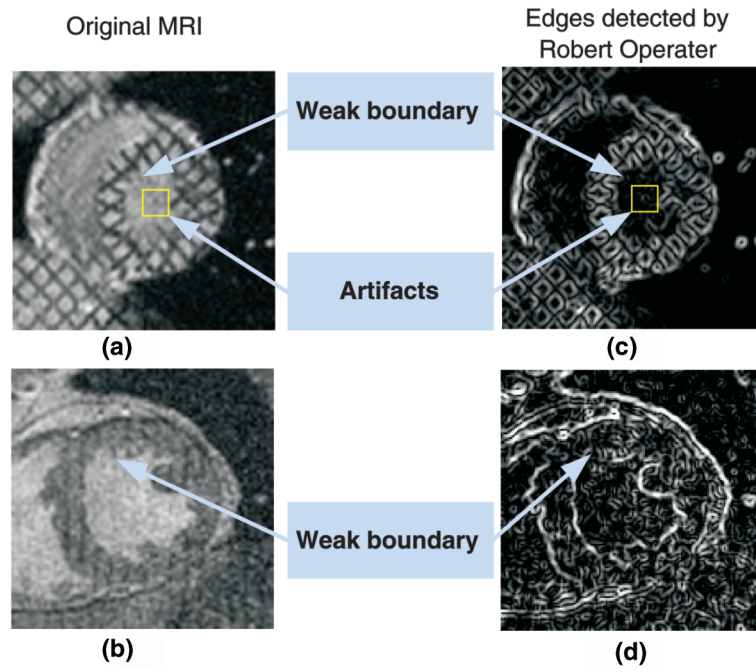


Figure 1. Cardiac MRI images (a,b) show the original MR images with weak boundary artifacts. (c,d) Results with the Roberts operator.

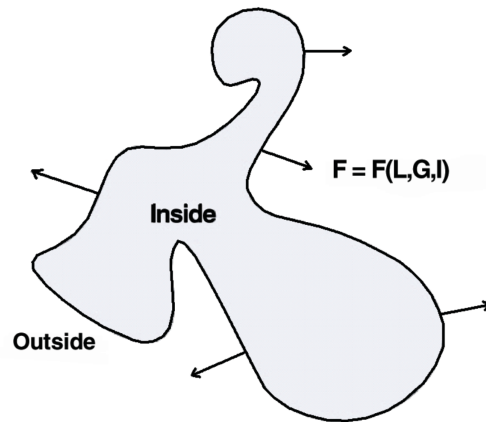


Figure 2. Interface propagation.

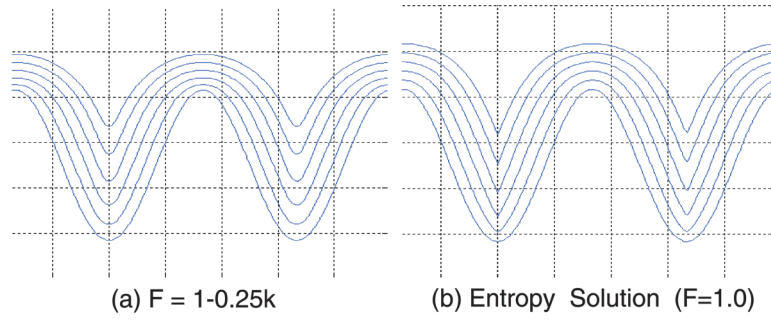


Figure 3. The entropy solution is the limit of viscous solutions.

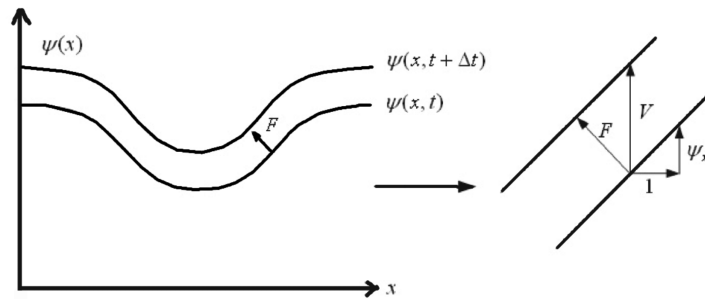


Figure 4. Variables for propagating graph.

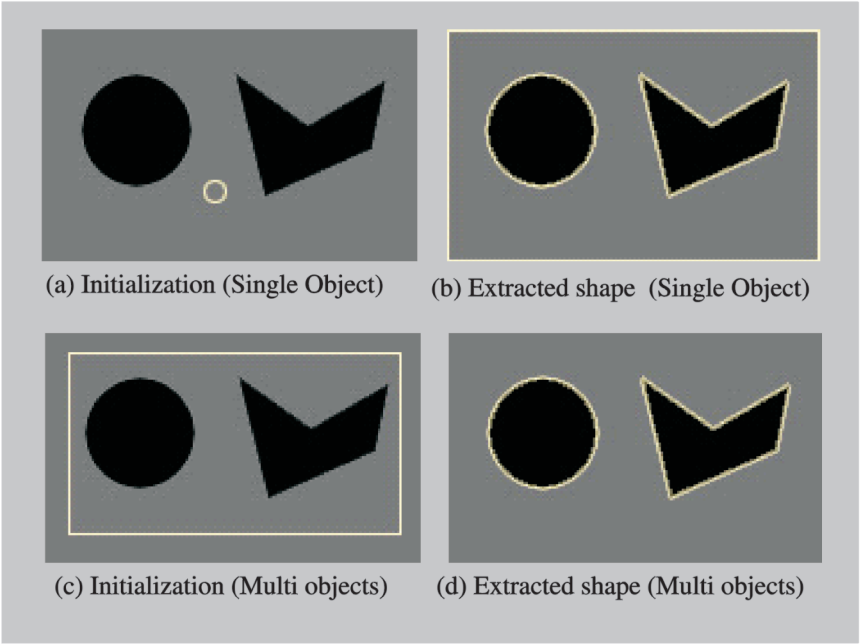


Figure 5. Shape extraction on multi-object image.

ϕ_6	ϕ_7	ϕ_8
ϕ_3	ϕ_4	ϕ_5
ϕ_0	ϕ_1	ϕ_2

Figure 6. Numbering scheme for derivative computation.

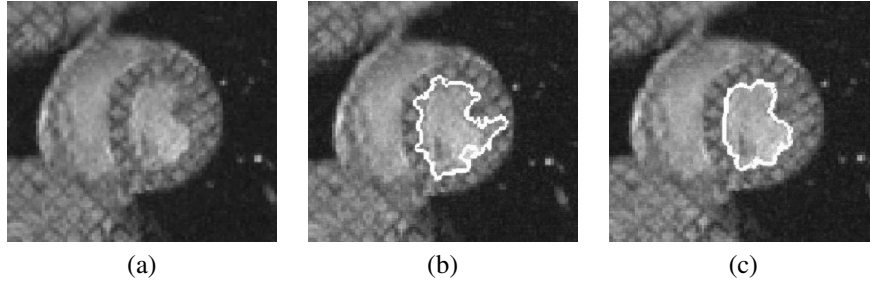


Figure 7. (a) Original MR image. The white line in (b) is the propagated front obtained by a classical level set speed term. It can easily leak beyond the true boundary due to the blurry boundary. (c) Result obtained by introducing the relaxation factor into the speed term.

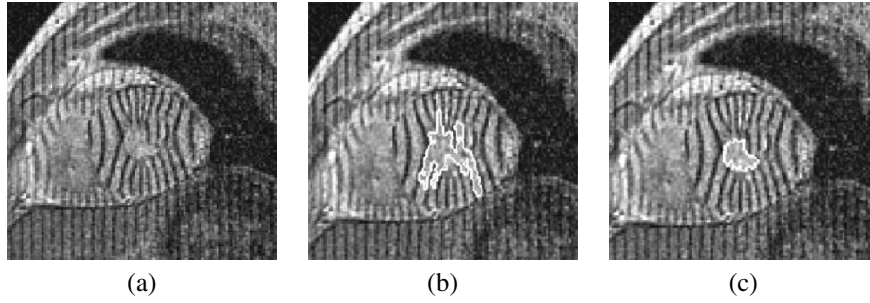


Figure 8. Segmentation of tagged MRI image: (a) strong tagged MR image; (b) result obtained using the standard level set method. This result has a serious leak phenomenon due to the strong tag lines. (c) Improved result obtained using the BPV feature to control propagation of the front.

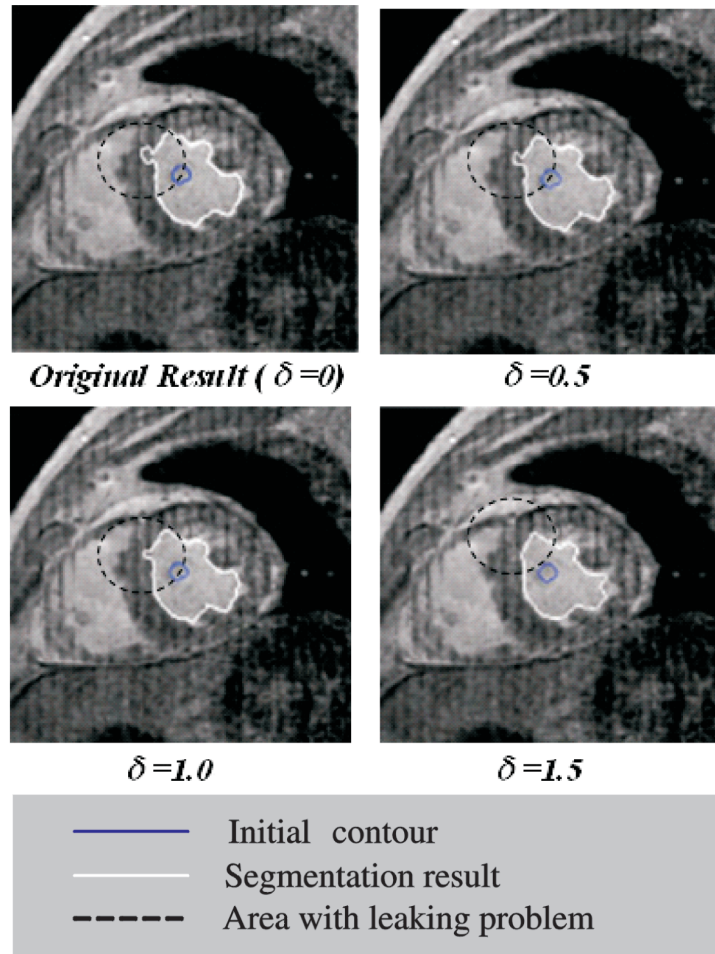


Figure 9. Introducing the relaxation factor into the front propagation to solve the leaking problem.

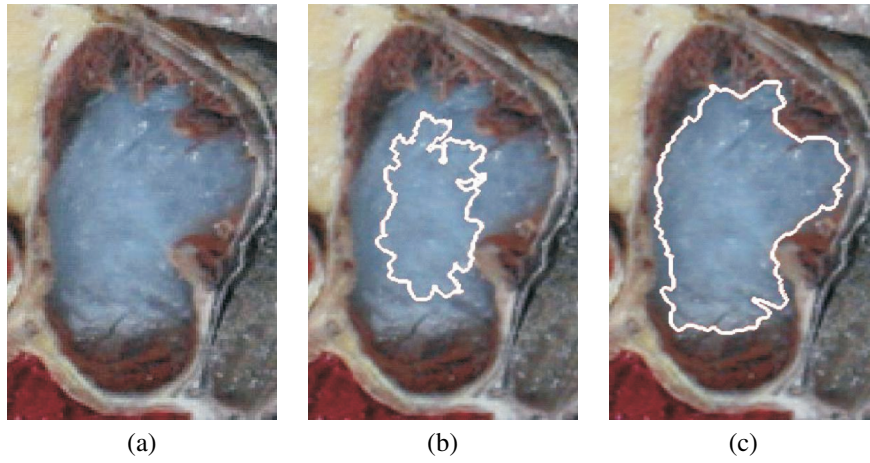
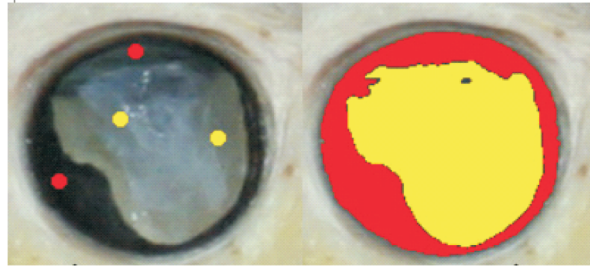
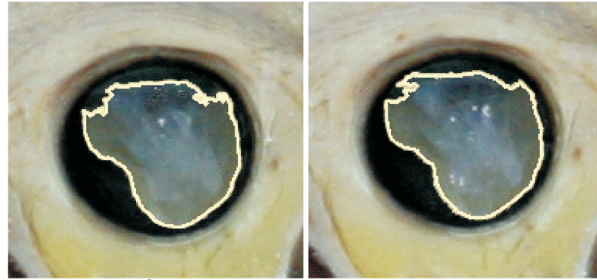


Figure 10. Segmentation of color slide image: (a) original color slide image; (b) propagation front stops in a non-boundary area; (c) result after incorporating color and texture features into the speed function.

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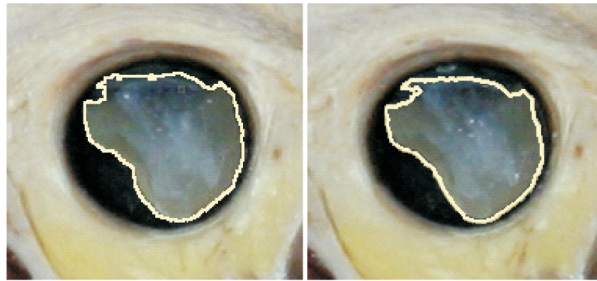


(a) Initial contour segmented in the first slice by level set



(b)

(c)



(d)

(e)

(b)-(e): Contours automatically detected in the subsequent slices

Figure 11. The user need only to click on the AOI to initialize the first slice. The contours in the subsequent image slices are then automatically tracked.

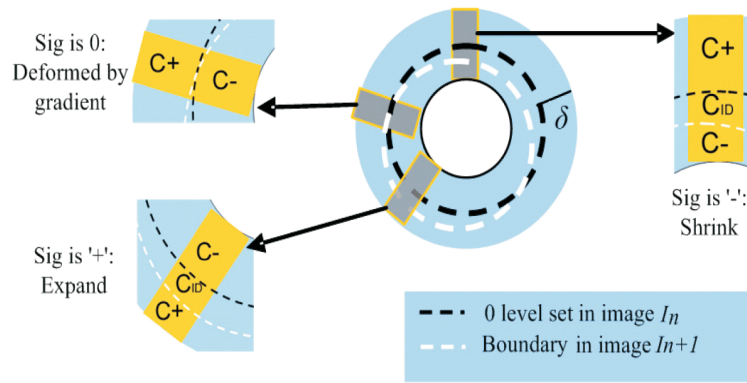


Figure 12. Design of the speed function for tracking: value and signal.

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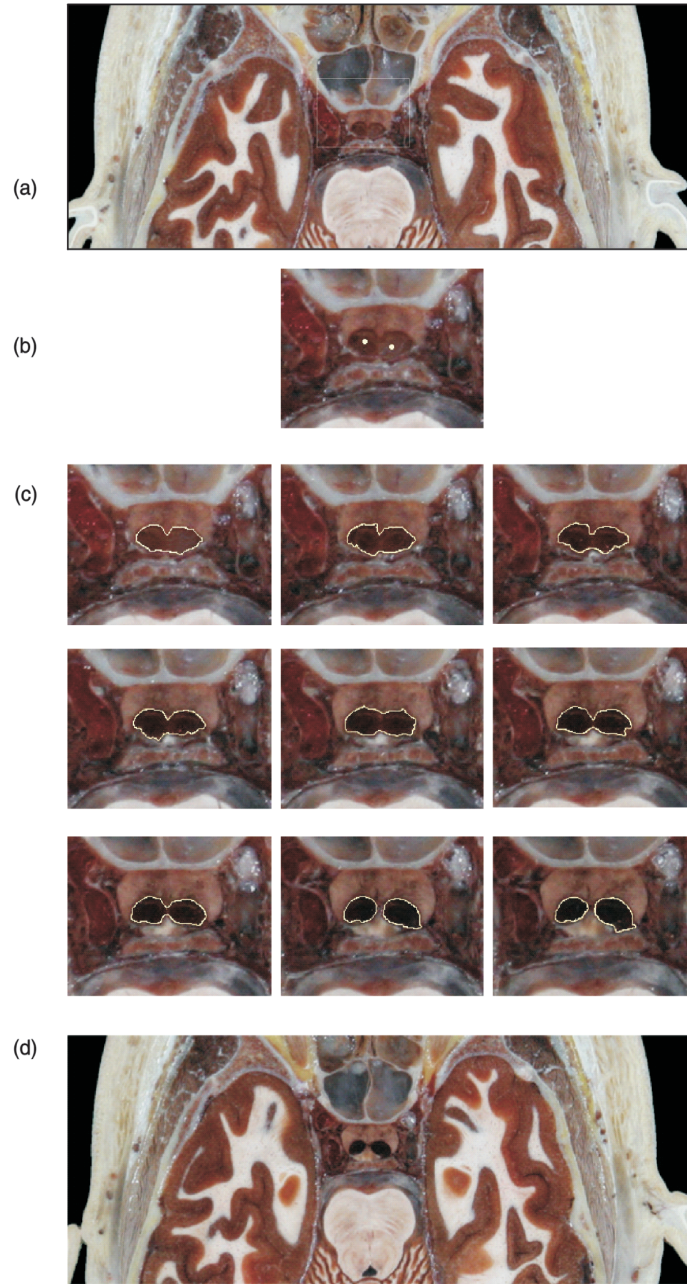


Figure 13. Tracking in the topology-changing case: (a) the first slice of serial CVH data; (b) initialization in the AOI; (c) boundaries in the subsequent image slices that are automatically tracked.