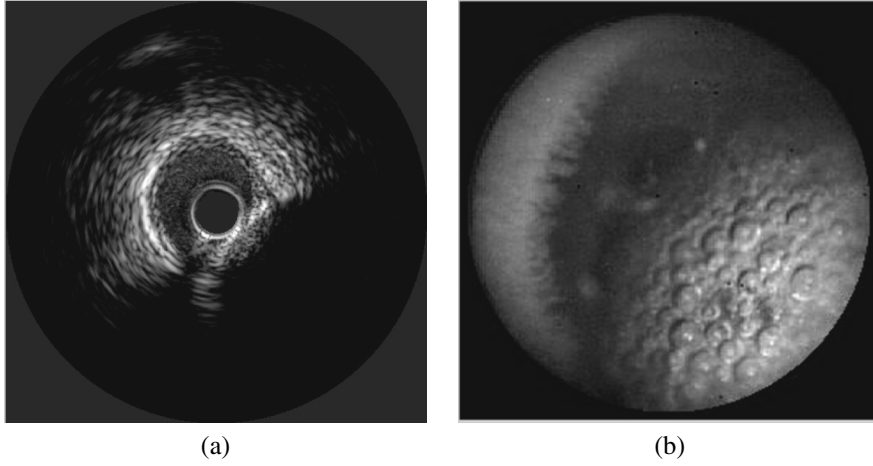
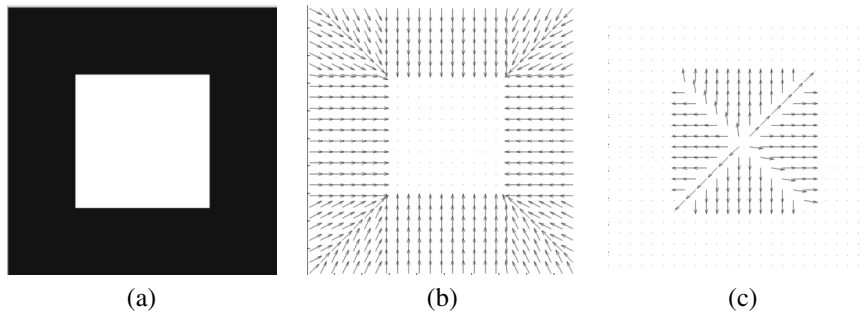


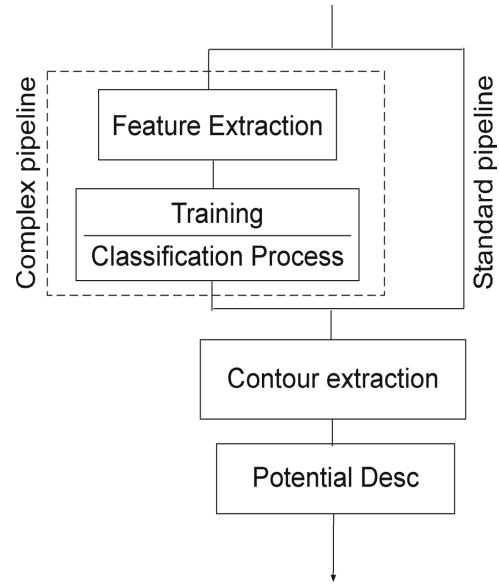
## CHAPTER 9: ALTERNATE SPACES FOR MODEL DEFORMATION



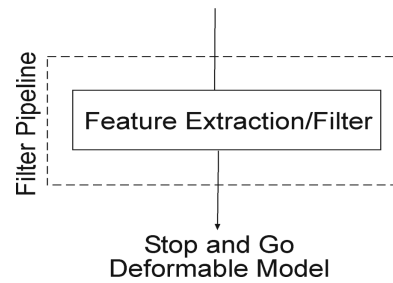
**Figure 1.** The different image modalities used in this chapter: (a) intravascular ultrasound image; (b) intestinal capsule endoscopic image.



**Figure 2.** Basic decomposition of the potential field in two terms: (a) characteristic function; (b) static representation of the GO term; (c) STOP term.

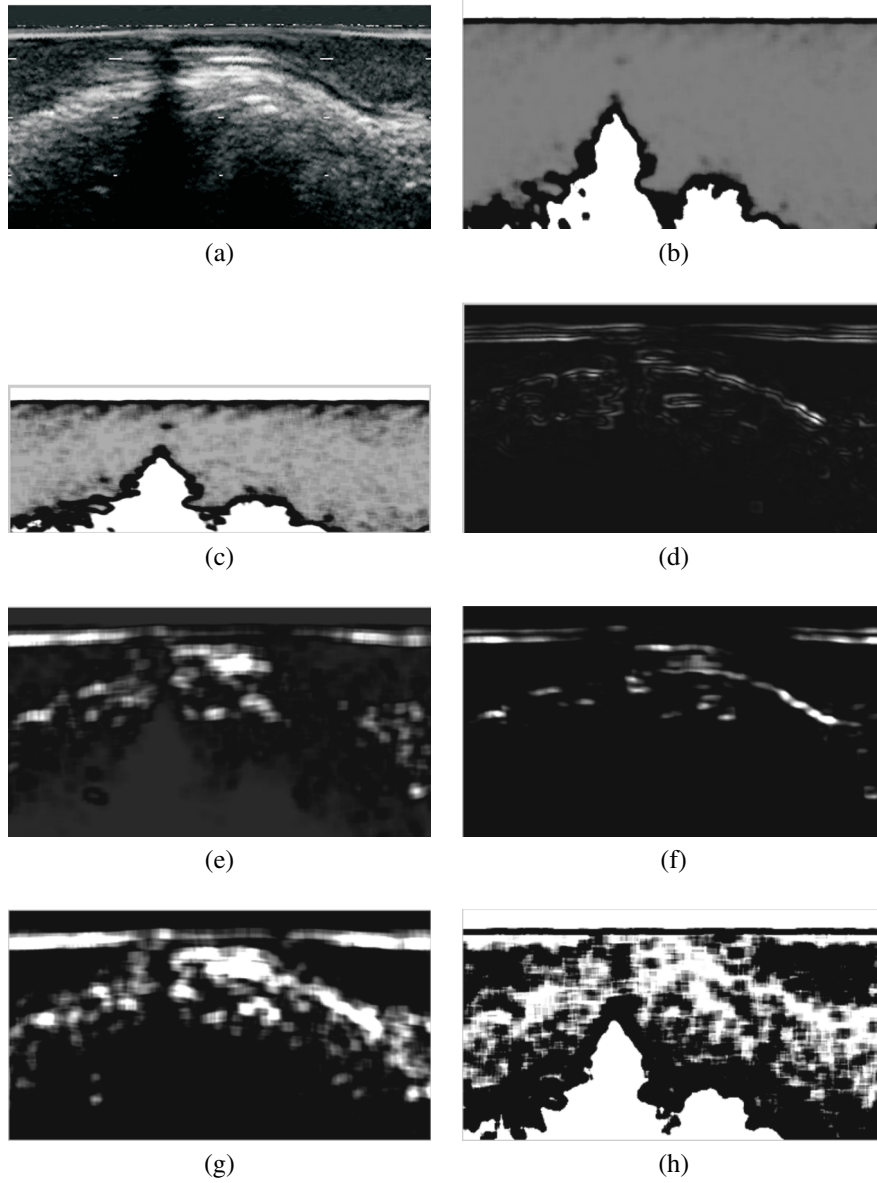


**Figure 3.** Standard and complex pipelines for deformable models.

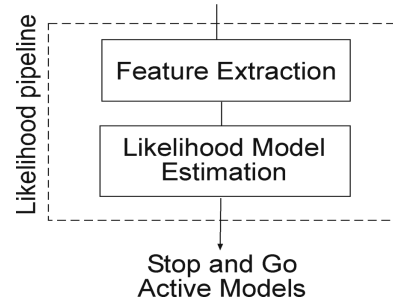


**Figure 4.** Filter pipeline for STOP and GO active models.

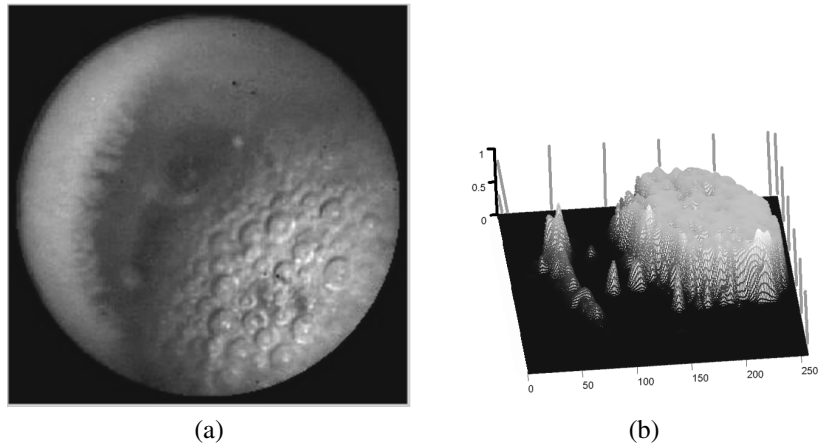
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**Figure 5.** Filter spaces using co-occurrence matrices in IVUS images (using polar coordinates): (a) original image; (b) energy measure map; (c) entropy measure map; (d) inverse Differential Moment measure map; (e) inertia measure map; (f) prominence measure map; (g) inertia measure map at 90 degrees; (h) shade measure map at 135 degrees.

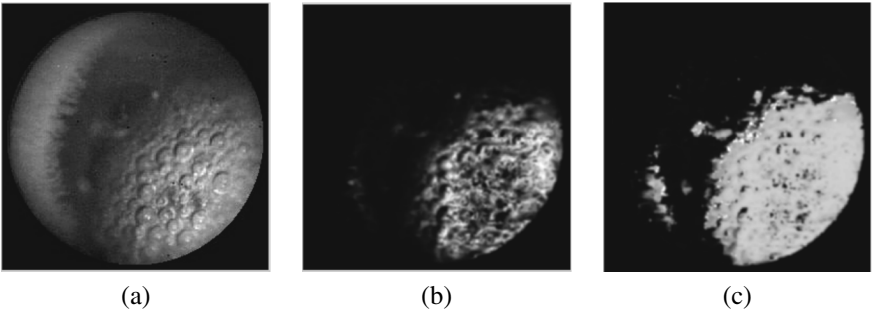


**Figure 6.** Likelihood map pipeline for STOP and GO active models.

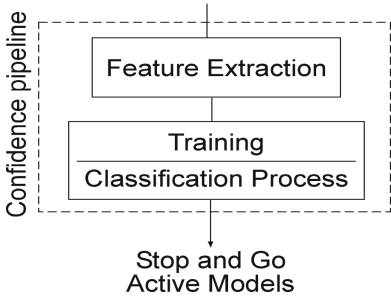


**Figure 7.** Likelihood map extraction using color information: (a) original image; (b) likelihood map for the bubbles region.

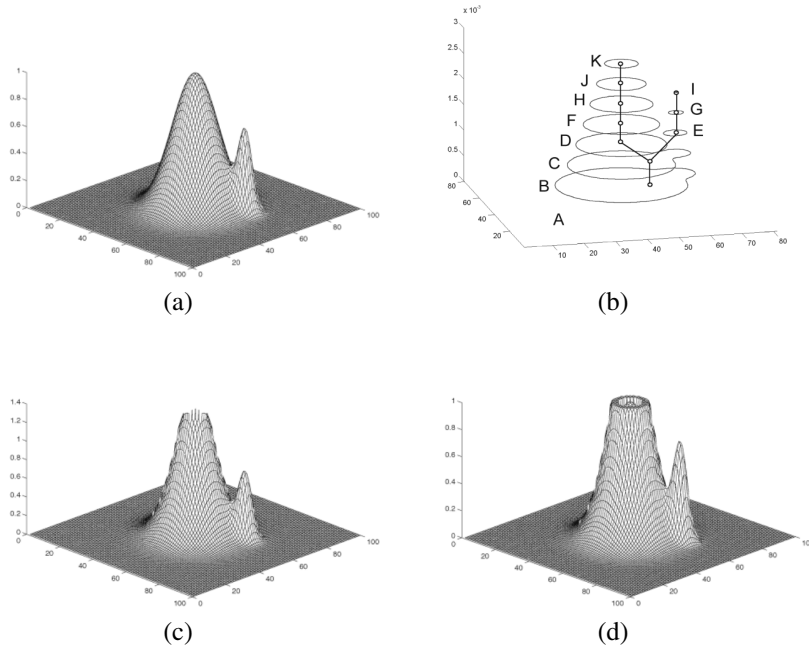




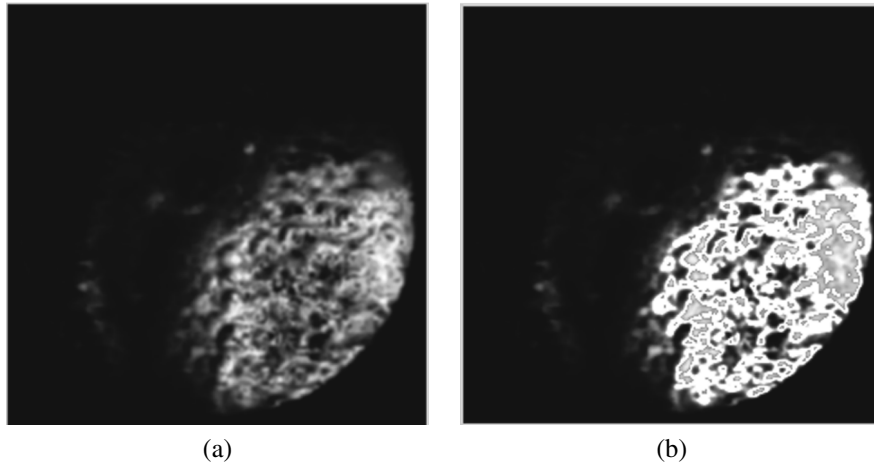
**Figure 8.** Likelihood map enhancement using the two-class approach: (a) original image; (b) original likelihood map; (c) enhanced likelihood taking into account the bubbles region and the background region.



**Figure 9.** Filter pipeline for the confidence rate approach of the STOP and GO active models.

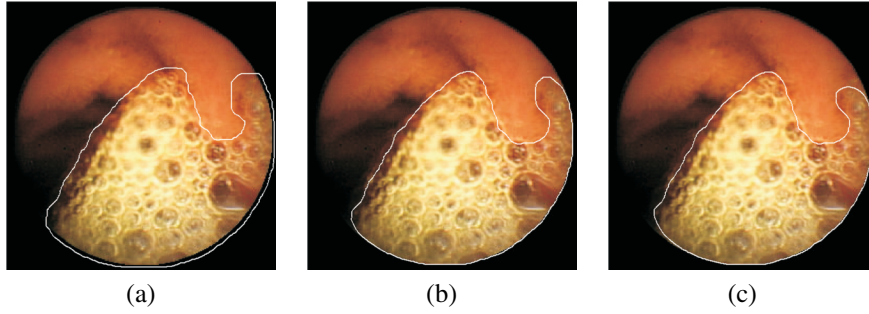


**Figure 10.** Creation of the topological enhanced likelihood map: (a) original likelihood map; (b) Max-Tree representation; (c) enhanced likelihood map without constraining maximum values; (d) final enhanced likelihood map.

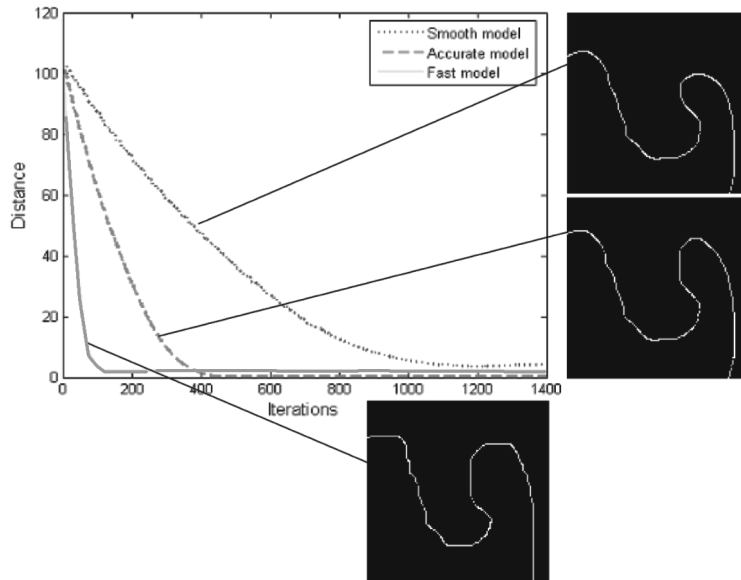


**Figure 11.** Likelihood map extraction using color information: (a) original image; (b) likelihood map for the bubbles region.

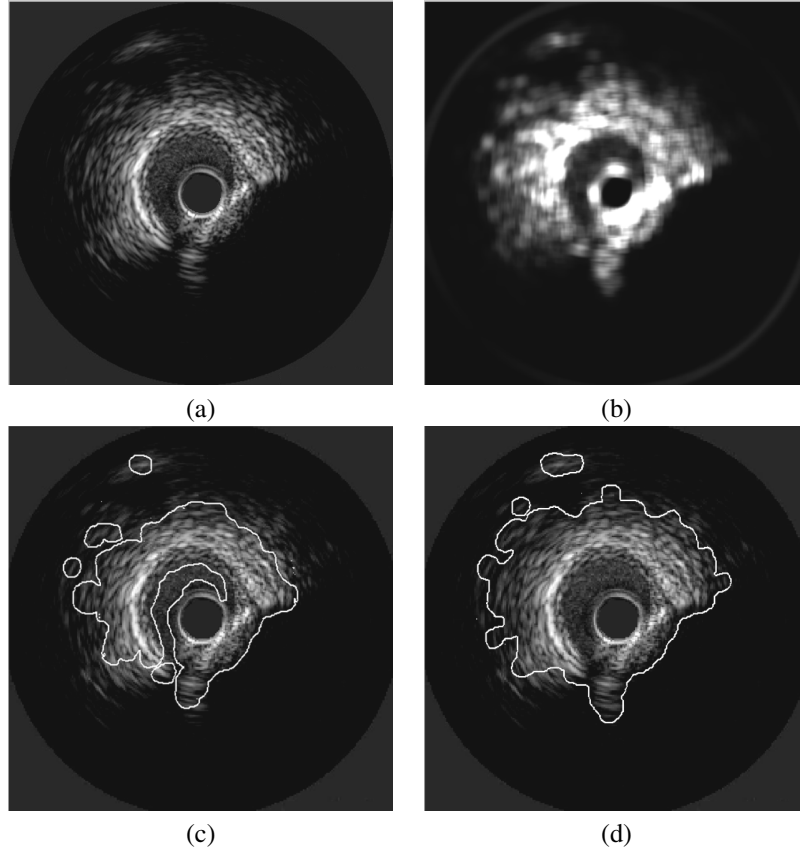
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**Figure 12.** Different results when changing the parameters controlling the smoothness of the model: (a) rough model; (b) average smooth model; (c) smooth model.

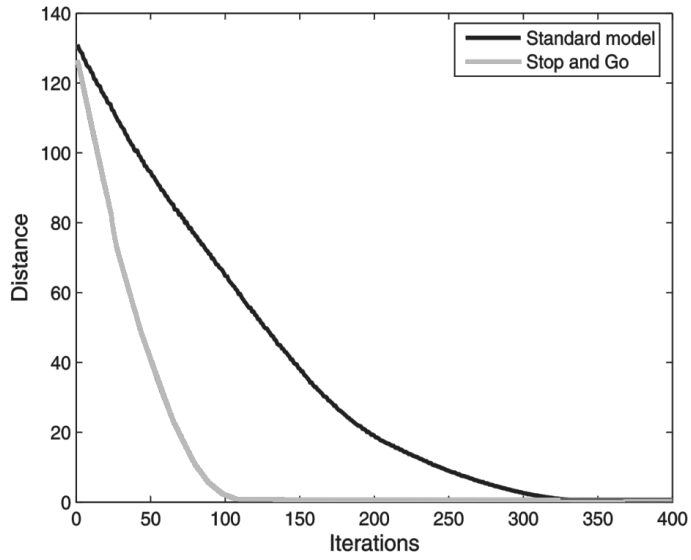


**Figure 13.** Convergence speed versus degree or smoothness.

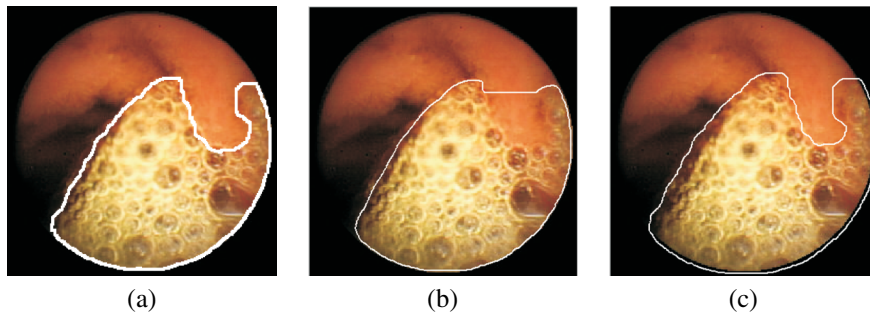


**Figure 14.** Segmentation of an IVUS image. Example of leaking control: (a) original image; (b) filter space for deformation using co-occurrence matrix measures; (c) example of STOP and GO model with a fast configuration; (d) example of STOP and GO model with anti-leak configuration.

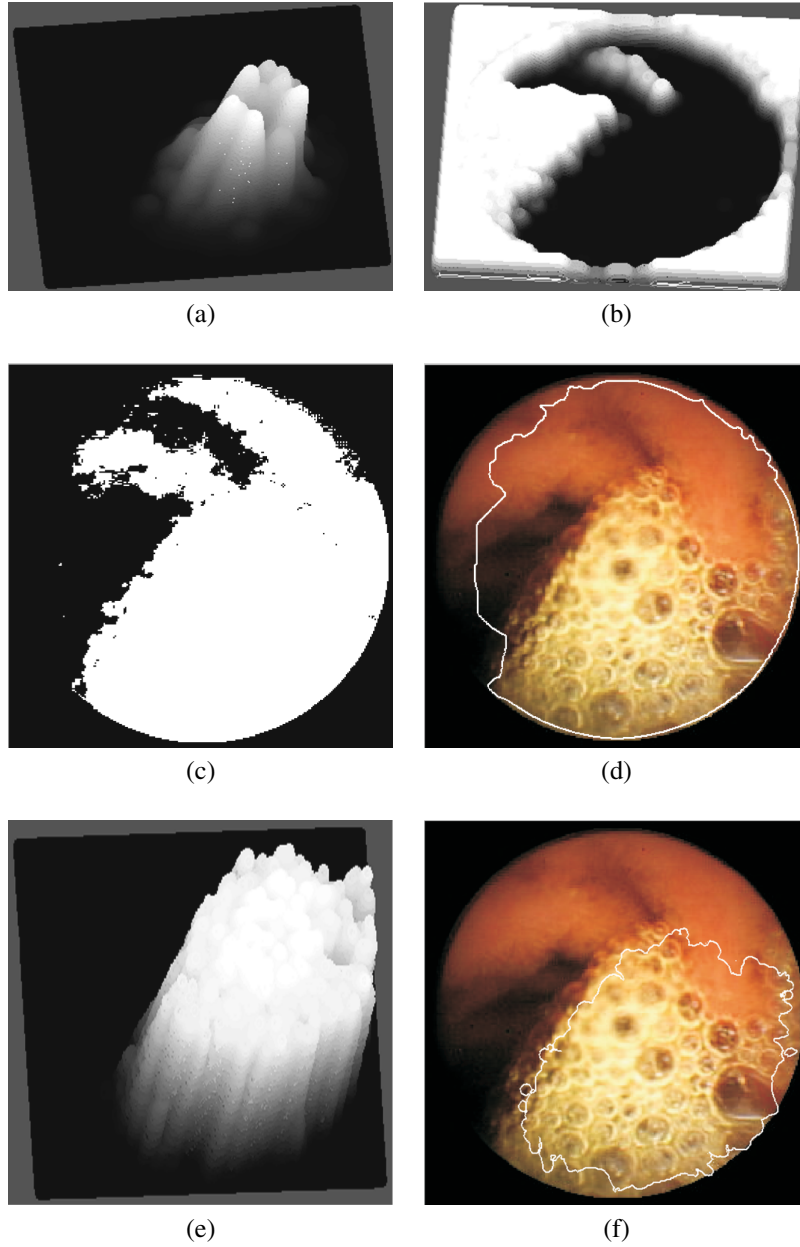
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**Figure 15.** Convergence speed (in number of iterations) for classical geodesic snakes and STOP and GO models.

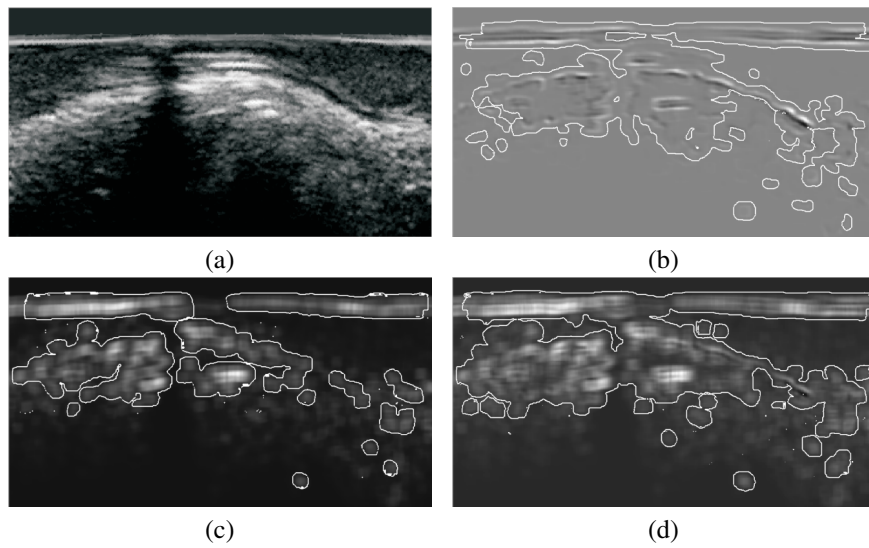


**Figure 16.** Creation of the topological enhanced likelihood map: (a) original likelihood map; (b) Max-Tree representation; (c) enhanced likelihood map without constraining maximum values; (d) final enhanced likelihood map.

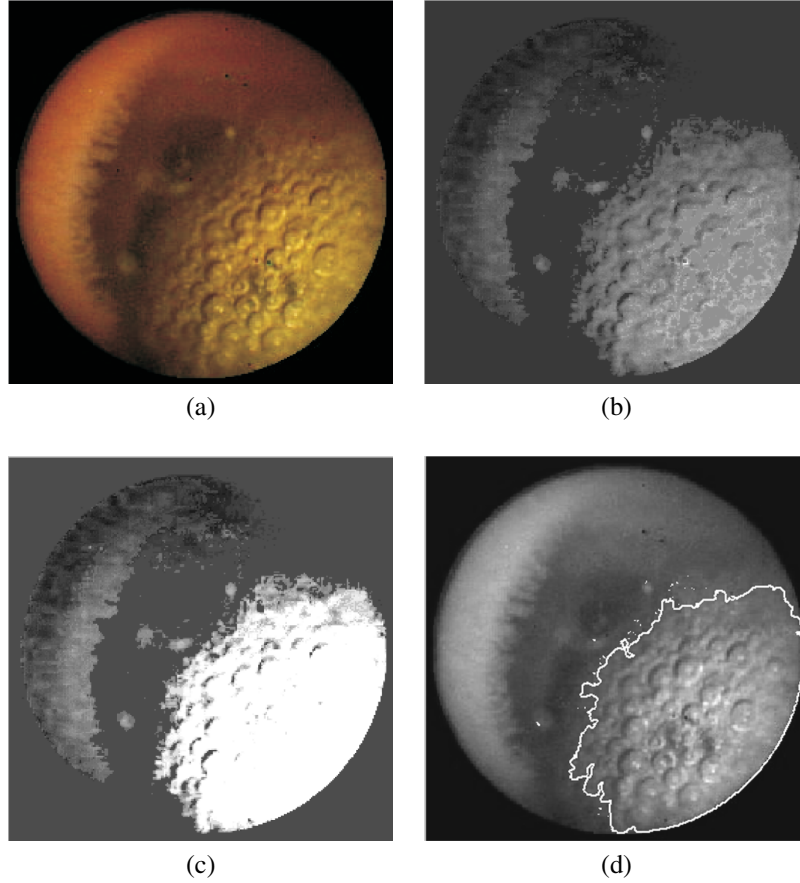


**Figure 17.** (a) Probability estimation of the region of interest. (b) Probability estimation of the background. (c) Mask created using the inequality  $P_{\text{Background}} \leq P_{\text{Target}}$ . (d) Resulting segmentation using region schemes. (e) Geometrically enhanced likelihood map. (f) Resulting segmentation using STOP and GO models.

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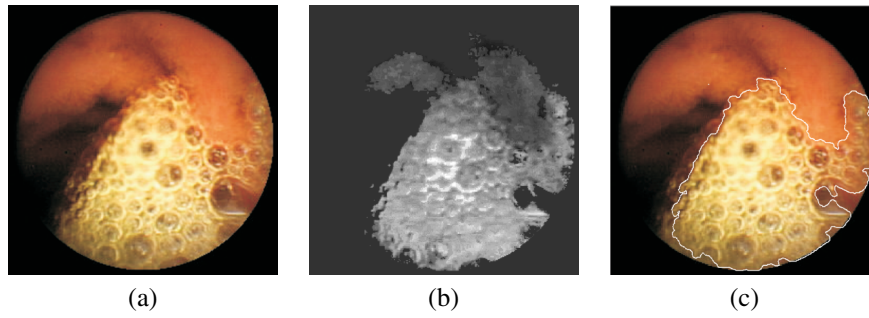


**Figure 18.** Segmentation of a polar IVUS image. Example using different filter spaces and a combination of filters: (a) original image; (b) filter space for deformation using co-occurrence matrix measures (IDM); (c) filter space for deformation using co-occurrence matrix measures (Inertia); (d) filter space composed by the linear combination of IDM and Inertia.



**Figure 19.** Segmentation of bubbles using confidence rate spaces: (a) original image; (b) confidence rate of an adaboost classifier trained with a bubble model; (c) geometric enhancement of the confidence rate map; (d) resulting segmentation.





**Figure 20.** Another segmentation of bubbles using confidence rate spaces: (a) original image; (b) confidence rate of an adaboost classifier trained with a bubble model; (c) resulting segmentation.