

An Automatic Media-Adventitia border Segmentation Approach for IVUS images

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In image processing, segmentation is considered one of the most important and hardest operations. The media-adventitia segmentation, in Intravascular Ultrasound (IVUS) images (Figure), is one of the first steps for a vase 3D reconstruction, and it is an important operation for many applications: measurements of its border circumference, area and radius; for studies about the mechanical properties and anatomical structures of vessels; which consequently will infer about therapy plans and evaluations; localization of pathologies. The purpose here is to segment the media-adventitia in IVUS images with high accuracy by combining a set of imaging-processing

techniques: Speckle Reducing Anisotropic Diffusion (SRAD), Wavelet, Otsu and Mathematical Morphology. Firstly, SRAD is applied to attenuate the speckle noises. Next, the vessel and plaque features are extracted by performing Wavelet Transform. Optimal thresholding is

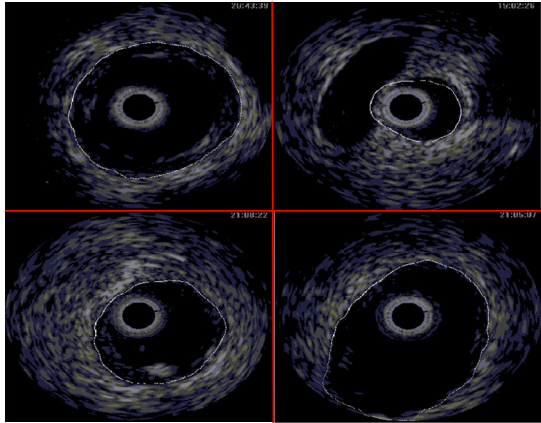


Figure. Segmentation result.

carried out by Otsu to create a binarized version of these features. Then, Mathematical Morphology is used to obtain an adventitia shape. Finally, this approach is evaluated by segmenting 100 challenging images, obtaining an average of True Positive (TP), False Positive (FP(%)), False Negative (FN(%)), Max False Positive (Max_{FP} (mm)), Max False Negative (Max_{FN} (mm)) (Table). Furthermore, its effectiveness is demonstrated by comparing this result with a recent one in the literature.

Table. Assessment of the proposed approach

TP (%)	FP (%)	FN (%)	Max _{FP} (mm)	Max _{FN} (mm)
92.83±4.91	3.43±3.47	7.17±4.91	0.27 ±0.22	0.31±0.2