

Common carotid artery morphology and dynamics estimated with automatic ultrasound segmentation

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Common carotid artery morphology and dynamics estimated with automatic ultrasound segmentation

1. Non-linearities in ultrasound processing, such as echo level saturation and logarithmic compression, strongly affect non-invasive estimates of common carotid morphology and dynamics (this thesis, chapter 3).
2. The automatic recognition of the common carotid artery in longitudinal ultrasound scans, though being a high level task for a computer, can be performed quickly and reliably by using a cascade of simple computational steps (this thesis, chapter 4).
3. Exploiting local arterial curvature in order to directionally smooth the adventitia prior to its automatic delineation is an effective way to increase the precision of wall position estimates (this thesis, chapter 5).
4. The combined application of 'sustain-attack filter' and 'multiscale anisotropic barycenter' successfully performs frame-by-frame automatic segmentation of intimal and adventitial layers on anterior and posterior common carotid artery walls, while its outcome also serves as an estimate for the quality of the ultrasound scan (this thesis, chapter 6).
5. Rather than trying to achieve better and better sub-pixel 'resolution', segmentation algorithms for vascular ultrasound images should focus on providing sonographers with informative visual feedback to improve scan quality.
6. There is no general solution for image segmentation problems; even our brain uses prior knowledge in an 'ad hoc' fashion for such tasks.
7. If population and measurement variabilities are comparable, the measurement technology should be the first target to address.
8. What our eyes see is not always what should be measured.
9. Too many interpolated points in a drawn line can hide the truth.
10. "The future cannot be predicted, but futures can be invented. It was man's ability to invent which has made human society what it is" (D. Gabor, 1964).