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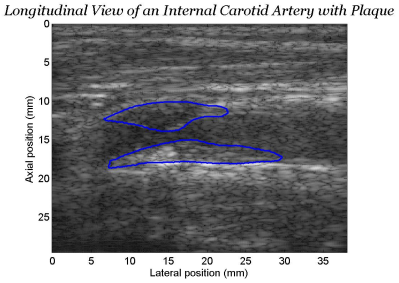
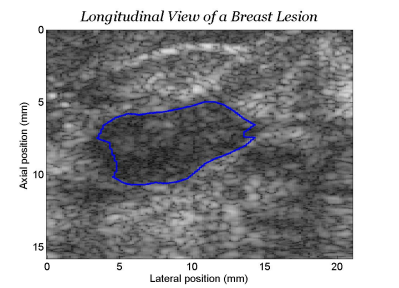
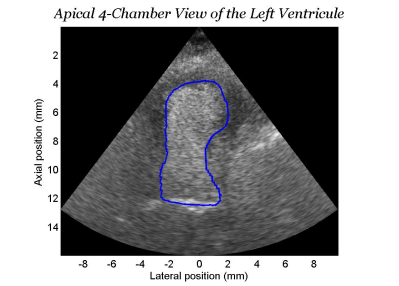
SEMI-AUTOMATIC SEGMENTATION OF ULTRASOUND IMAGES







Background

The intima-media thickness of the carotid artery can be measured by ultrasounds to detect the presence of atherosclerotic diseases. Algorithms that can replace time consuming manual procedures and perform segmentations with minimal user interaction (and intra and inter observer variability) are essential, but obtaining robust results with noisy ultrasound images remains a challenge. Moreover, the algorithm can be used for movement tracking of various anatomical objects relevant to breast imaging, echocardiography, elbow tendon imaging, and many other medical applications.

Technology

The segmentation method we propose uses a statistical Bayesian model to interpret B-mode ultrasonic images of the carotid artery's intima-media layers, as well as various anatomical objects such as breast lesions, left ventricle of the heart in echocardiography, elbow tendons, and many other organs. The model uses a video sequence and input analytical, geometrical and physiological priors to help assess thickness, action (or energy) of a curve, and temporal movement between two consecutive images. Following the manual introduction of a few points on a chosen image of the sequence, all computations are automatically performed using image intensity statistics that better take into account low signal-to-noise regions.

Application

The software can easily be coupled with commercial echographs. Apart from the monitoring of atherosclerosis through intima-media thickness measurement, the algorithm can also be used in combination with ultrasonic elastography. The algorithm can also be used for tracking various anatomical objects in video loops of ultrasound images for pathology assessment, as the pre-segmentation of images can help minimize artefacts due to motion and computational time for image analysis by reducing the region of interest to the segmented region.

Competitive Advantages

- Easy to implement on any commercial system
- Guaranteed to converge to an optimal solution
- Robust segmentation even on low signal-to-noise images
- Works on pathological arterial walls, breast lesions, left ventricles of the heart in echocardiography, and elbow tendons
- Can easily be adapted to segment other anatomical structures

Patent

Granted US patent 8,600,128.

Next Steps

The technology is available for licensing.

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