

AbstractID: 2522 Title: Boundary Based Vs. Region-Based Segmentation Techniques for Breast Lesion Phantoms produced by Fischer's Full Field Digital Mammography Ultrasound System (FFDMUS): A Novel Tool for Performance Evaluation of LCD's and CRT's

Purpose: This paper presents a performance evaluation strategy for LCD and CRT display characterization using ultrasound data acquired from Fischer's full field digital mammography and ultrasound system (FFDMUS) prototype.

Method: Lesion segmentation of these ultrasound images acquired through the FFDMUS was performed using two approaches: (a) Gradient Vector Flow (GVF) and (b) Signal-to-Noise (SNR). The protocol consisted of FFDMUS ultrasound data acquisition with known X-ray and ultrasound parameters. The ultrasound ROI images were displayed on LCD and CRT displays, memory grabbed and then segmented using GVF and SNR tools. Note that during the memory grabbing process from the displays, the spatial properties of the displays were ignored. This output was then optimized for partial volume correction, given the ideal boundary. The performance of the segmentation algorithms was evaluated by quantifying the mean error between the ideal boundary and the computer-estimated boundary. Polyline distance metric (PDM) was used as a ruler. We used the segmentation and error quantification system on LCD and CRT displays.

Results: we optimized our segmentation algorithm over 22 ultrasound FFDMUS images. The mean and standard deviation using GVF on LCD/CRT were 0.870 & 0.207/0.900 & 0.244. Correspondingly, the mean and standard deviation using SNR on LCD/CRT were 1.129 & 0.321/1.105 & 0.315.

Conclusions: It was observed that both the segmentation strategies are comparable on both LCD's and CRT's for this data set used. Also the GVF performed better than SNR, as it was an interactive methodology.