

# AbstractID:9685Title:Comparison of image segmentation methods on classification performance of FFD-MCAD

## Purpose:

To investigate the effect of lesion segmentation on classification performance of FFD-MCAD

## Method and Materials:

Breast lesion segmentation is a necessary step in the overall image analysis for computer-aided diagnosis. Two automatic lesion segmentation methods were investigated using a database of 146 malignant and 136 benign FFD-MCAD cases. A region-growing method utilizes the size and shape of the evolving lesion contour to determine the lesion margin. A dual-stage segmentation method employs an initial radial gradient index (RGI) based segmentation and an active contour model. Then 15 lesion features were automatically extracted to quantify the characteristics of margin, spiculation, contrast, shape and texture. An effective subset of features were automatically selected by a stepwise method and merged with a BANN to yield a discriminant score, which estimates the probability of malignancy (PM) for a given lesion. The performance of individual features and the selected feature subset was evaluated using receiver operating characteristic (ROC) analysis, with the area under the ROC curve as a figure of merit.

## Results:

In leave-one-out evaluation by lesion, the effect of feature subset by the dual-stage segmentation, including two spiculation features and one gradient texture, yielded an AUC of 0.78, while the effect of feature subset from the region-growing segmentation, including three spiculation features, one margin sharpness and one average gray level of lesion, yielded an AUC of 0.72. The difference is statistically significant ( $p=0.04$ ).

## Conclusion:

Our results show that the dual-stage segmentation method has a better classification performance than the region-growing method.

## Conflict of Interest (only if applicable):

Some authors receive royalties, research fund or are stockholders in R2 Technologies, Inc, a Hologic company.