

AbstractID: 1547 Title: Investigation of Psychophysical Measures in Selecting Similar Images for Clustered Microcalcifications on Mammograms

We have been developing a CAD system in which a set of malignant and benign images similar to an unknown lesion are presented to radiologists for assisting their image interpretation. The purpose of this study was to investigate image features and psychophysical measures for selection of similar images that would be useful for radiologists in the diagnosis of clustered microcalcifications on mammograms. The images used in this study included 884 regions of interest (5cm x 5cm) with clustered microcalcifications, which were obtained from the Digital Database for Screening Mammography. Five radiologists provided subjective similarity ratings for 114 pairs of clustered microcalcifications based on overall impression for diagnosis. Ratings were marked on a continuous rating scale between 0 and 1, where 0 and 1 correspond to two lesions not similar at all and almost identical, respectively. A number of image features were automatically determined from the lesions, and the differences in feature values for a pair of lesions were compared to the average ratings by radiologists. An artificial neural network (ANN) was trained with the radiologists' ratings as teacher and selected features as input so that the ANN will learn the relationship between subjective ratings and features. Thus, the trained ANN would provide a psychophysical measure for a pair of unknown lesions. To evaluate the usefulness of image features and psychophysical measures, correlation values between radiologists' similarity ratings and objective measures were determined. Results of correlation values will be presented to discuss the potential advantages of psychophysical measures.

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