

AbstractID: 8954 Title: Investigation of Psychophysical Measure for Selection of Similar Images for Mammographic Mass Lesions

Several investigators have demonstrated the usefulness of similar images in assisting radiologists to diagnose cancers. However, it is uncertain how the radiologic similarity can be defined, objectively and subjectively. Our purpose in this study was to investigate new psychophysical measures in selecting similar images that would be useful for radiologists in distinguishing between malignant and benign mass lesions in mammograms. The database used in this study was the University of South Florida's Digital Mammography database distributed via website. We employed 1444 regions of interest (5 cm x 5 cm), each of which included a single mass lesion. We modified the background density and contrast in order to facilitate the subjective comparison of the lesions. A number of image features were determined from various regions based on the outline of a mass lesion. Five radiologists provided the subjective ratings of similarities for the pairs of masses in terms of the overall impression for diagnosis. An artificial neural network (ANN) was trained with selected features as input and average values of radiologists' similarity ratings as output. Therefore, the trained ANN provided a psychophysical similarity measure for an unknown pair of masses, which is based on the combination of radiologists' knowledge and the computer-extracted features. Preliminary results show a good correlation between psychophysical measures and radiologists' similarity ratings. Our study indicated the usefulness of psychophysical measures for selecting the similar images that may be useful to radiologists in distinguishing malignant from benign breast lesions.

RAS and KD: shareholders, R2 Technology Inc.; KD: shareholder, Deus Technology Inc.