

AbstractID: 7681 Title: FROC curves without arbitrary scoring of marks: perceptual vs. scored analysis of CAD data

A free-response study generates data in the form of mark-rating pairs. Any mark closer to a lesion than the acceptance radius (or closeness or overlap criterion) is scored as lesion localization and other marks are scored as non-lesion localizations. A scored FROC curve is a plot of lesion localization fraction vs. non-lesion localization fraction. Because of the inherently arbitrary nature of the acceptance radius choice, the FROC curve is also arbitrary. A method of statistically modeling the spatial distribution of the marks with respect to lesion centers is described. This model allows one to obtain statistical (i.e., maximum likelihood) estimates of the numbers of marks that were true lesion localizations as opposed to false localizations. These estimates can be used to plot a perceptual FROC curve that is totally independent of acceptance radius choice. The method was applied to several CAD datasets. It was found that the perceptual and scored curves were in good agreement in most cases, and minor deviations were attributed to some cases of questionable classifications of marks. CAD developers could use this method to evaluate their algorithms in a manner that makes inter-comparisons more meaningful.