AbstractID: 8857 Title: Self-assessment as a strategy to improve performance of computer-aided diagnosis in breast ultrasound

Purpose: The aim of this work was to develop and apply a computerized auto-assessment method in which a computer-aided diagnosis (CAD*x*) system itself provides a level of confidence for its output for each radiologist-identified lesion. **Methods and Material:** We investigated the potential of computer-derived confidence levels both 1) as an output aid to radiologists indicating a confidence level for the computer-estimated probability of malignancy and 2) as an automated method to improve the computer classification performance – in the task of differentiating between cancerous and benign lesions – *without* eliminating any lesions from the database. For the former, the CAD*x* cancer classification performance was assessed within 3 confidence categories where each category included a range of confidence levels. For the latter, the computer-derived confidence levels were used as an automated criterion in the determination of the computer-estimated probability of malignancy for each actual lesion based on probabilities obtained from different views. The stand-alone computer performance was assessed within a leave-one-case-out protocol using a database of sonographic images from 542 patients (19% cancer prevalence). **Results:** The classification performance increased substantially from an area under the ROC curve (AUC value) of 0.66 to 0.72 to 0.92 for confidence categories 'Poor', 'Fair' and 'Good', respectively. The use of the auto-assessment method in an automated classification-improvement protocol resulted in a modest but statistically significant increase in the AUC value with respect to the performance obtained using the 'traditional' CAD*x* approach, increasing the AUC value from 0.89 to 0.90 (p-value 0.03) for the entire database. **Conclusion:** We believe that computer-provided confidence levels may be helpful to radiologists who are using CAD*x* output in diagnostic image interpretation.