AbstractID: 12786 Title: A novel relevance feedback approach for efficient mammogram image retrieval

Purpose: With the rapid increase of medical databases and PACS (picture archiving and communication systems) image volumes, it became critical to develop new tools to retrieve images from these archives more effectively and efficiently for routine clinical practice. A key factor for successful image retrieval systems lies in the development of efficient methods that can derive high-level semantic concepts from low-level image content features. Despite many efforts, an efficient retrieval system for medical images still remains a challenging problem due to their complex contents in relation to disease conditions. Towards this goal we have developed a machine learning framework that utilizes expert's knowledge for online retrieval of relevant mammogram images based on clustered microcalcifications. **Materials and Methods:** We tested a database of 200 clinical mammograms that were taken from 104 patients with known pathology. To automatically retrieve mammograms from the database that are perceptually similar to a given query image, we proposed an efficient relevance feedback algorithm based on support vector machine (SVM) regression and incremental learning that dramatically reduces the processing time, avoiding the retraining of the retrieval system. **Results:** We conducted various experiments to evaluate the developed algorithm under varying user's interactions. It was observed that our proposed method showed significant superiority over off-line learning. In particular, in a matching fraction test where the top-*k* retrieved images were compared with the disease condition of the query image (benign or malignant) after the user's relevance feedback, the proposed method achieved a matching fraction as high as 82.4%. **Conclusions:** We have developed a novel relevance feedback method for effective retrieval of relevant mammogram images. Our experimental results demonstrated that the proposed method is not only better in performance, but more computationally efficient than offline SVM based on re-training, while maintaining its effectiveness for online clinical application.