Implementation of Random Walk methodologies to cluster microcalcifications in mammography imaging

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Digital mammography is an effective method for the identification of breast cancer. Significant findings on a mammogram are the masses and the microcalcifications. Microcalcifications are deposits of salts appearing in a mammogram either isolated or in groups (clusters). There are two types of systems which help the radiologist to interpret a mammogram, namely the Computer Aided Detection and Computer Aided Diagnosis. A Computer Aided Detection system contributes in the finding of regions of interest, while a Computer Aided Diagnosis system accepts as input these regions of interest and classifies them whether they are benign or malignant. In these work, the regions of interest are groups of microcalcifications which require further analysis and examination.

In this thesis, the goal is the development of an algorithm capable to detect microcalcifications-related regions of interest in mammograms. There are many algorithms of clustering, which can be implemented for the identification of groups of microcalcifications. In this study we have investigated methods of Random Walk . The Random Walk algorithm starts in different points of an image and tries to find/cluster points (microcalcification centroids) in the image.

Once we have found groups of microcalcifications highlighted by the algorithm, we compare with the clusters annotated by the radiologists. The evaluation of the algorithm exhibits satisfactory results requiring optimization. There are only a few images of absolute mismatch between the regions highlighted by the algorithm and those annotated by the doctor.

TOPIC: Image analysis, Microcalcification Clustering, Computer Aided Detection

KEY WORDS: Clustering, Image findings, Random Walk Algorithm