RF0105 Topological Analysis of Clusters of Microcalcifications in Digital Mammography

Digital Image Processing Laboratory

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The problem that is intended to be addressed in this research is: given a mammography database, some of which contain microcalcifications and some of the latter forming clusters of microcalcifications, how to process the images to detect clusters of calcifications in such a way as to minimize the number of false negatives; that is, the cases where there really is a grouping of calcifications, the system does not detect them and on the other hand also minimize the number of false positives; that is, the cases where there is not really a grouping of calcifications, the system detects a grouping.

This research focuses on confirming that a finding located on the mammogram corresponds or not to calcification. The decision is made by a classifier that learns a behavior pattern based on a series of characteristics extracted from each of them. Determining whether or not a finding corresponds to calcification is one of the most important contributions of this work, since it will serve to detect clusters.

With the intention of addressing this problem, two methods are proposed: the first, to identify calcifications and the second, to identify clusters of microcalcifications. The final result of the system is the list of centroids of each grouping and the list of centroids of the calcifications that make up each grouping. From this information, the number of groupings of each mammogram and the number of calcifications of each grouping are obtained.

The method for detecting clusters of calcifications is different from the method for detecting individual calcifications, clusters can be detected only after calcifications have been identified. Clusters of 3 or more microcalcifications within a 1 cm2 area can be considered a cluster. The criteria used to detect them will depend on the density of calcifications per cm2, the regions with the highest density will be chosen first.