The extraction of lesions from their surrounding parenchymal background is an important step in many computerized mass-detection schemes for digital mammography. We have developed a novel lesion segmentation technique based on probabilistic models to segment mass lesions from their surrounding background. A series of image contours is created using gray-level information as well as prior knowledge of the shape of typical mass lesions. Probability distributions for gray-levels inside and outside the contours are estimated, and subsequently employed to determine the probability that the actual lesion is represented by each given contour. The contour that maximizes this probability is selected as the final lesion partition or contour. We tested this method against a conventional region-growing algorithm using a database of biopsy-proven, malignant lesions, and found that the new lesion segmentation algorithm performed better in a comparison study with radiologists' outlines of the same lesions. At typical overlap thresholds, the new algorithm correctly segments 34% more of the lesions in our database. It is expected that with the new segmentation, the performance of feature analysis and the overall mass detection performance will improve.

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