

Enhancement and Breast Hierarchical Segmentation on Digital Mammograms

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Our algorithm enhances the results of digital mammogram processing. For image enhancements and appearance improvement, noise or error elimination, or to highlight certain image features, the algorithm uses density measures based on a normalized breast representation, method of image equalization and Kuvahara filter. This first phase is designed to have a very high sensitivity; the large number of false positives is acceptable, since they will be removed in the second phase. In the second phase moments are used for image description and as its intensity distribution shape indication. This phase automatically generates the boundary values and segments the mammograms hierarchically. Using the grid improved both the image processing and mammogram segmentation. We hope that grid infrastructure can be used clinically for early detection of subtle signs of breast cancer, including calcifications and speculated masses.

3. Impact

Breast cancer as a medical condition, and mammograms as images, are extremely complex with many dimensions of variability across the population. X-ray mammography is the most reliable method available at present for the detection of breast cancer in screening programs, although it still does not detect all cancers. The proposed algorithm for digital image processing could be used in a breast cancer-screening center in many possible scenarios. The system could be used to pre-screen mammograms and select those areas that need more attention for analysis. The results are expected to improve the accuracy of early breast cancer mammography diagnosis, reduce patient mortality, and reduce health care costs. Therefore it is important to split the mammograms into interesting regions in order to put into focus a technique when we search for abnormalities.

4. Conclusions / Future plans

The results obtained at clinics for radiology in our country have shown a general good use. Future enhancements will be done while trying to increase the collaborative work between local health care organizations in sharing and diagnosing mammogram images, aiding early breast cancer detection. The grid infrastructure provides good platform for this work, and we will focus our efforts to enhance the methods, to consolidate the algorithms and to use the grid for image processing.

Provide a set of generic keywords that define your contribution (e.g. Data Management, Workflows, High Energy Physics)

Digital mammography, Grid infrastructure, Computer-aided detection, algorithm

1. Short overview

Computer use by clinicians in digital mammography image screening has advantages over traditional methods: enhancing the appearance of the images and highlighting suspicious areas. In this paper, we present our own algorithm that hierarchically segments the digital mammograms. It consists of two phases: the pre-processing and the processing phase of hierarchical mammograms segmentation. Grid infrastructure capabilities were explored in order to improve the algorithm's implementation.

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