Thermography based breast cancer detection using texture features and minimum variance quantization. 2014

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Abstract

In this paper, we present a system based on feature extraction techniques and image segmentation techniques for detecting and diagnosing abnormal patterns in breast thermograms. The proposed system consists of three major steps: feature extraction, classification into normal and abnormal pattern and segmentation of abnormal pattern. Computed features based on gray-level co-occurrence matrices are used to evaluate the effectiveness of textural information possessed by mass regions. A total of 20 GLCM features are extracted from thermograms. The ability of feature set in differentiating abnormal from normal tissue is investigated using a Support Vector Machine classifier, Naive Bayes classifier and K-Nearest Neighbor classifier. To evaluate the classification performance, five-fold cross validation method and Receiver operating characteristic analysis was performed. The verification results show that the proposed algorithm gives the best classification results using K-Nearest Neighbor classifier and a accuracy of 92.5%. Image segmentation techniques can play an important role to segment and extract suspected hot regions of interests in the breast infrared images. Three image segmentation techniques: minimum variance quantization, dilation of image and erosion of image are discussed. The hottest regions of thermal breast images are extracted and compared to the original images. According to the results, the proposed method has potential to extract almost exact shape of tumors.

Keywords: breast cancer, breast classification, breast segmentation, thermography, texture analysis