

## Marker-Controlled Level-Set for Segmenting Breast Tumor from Thermal Images

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**Abstract :** Contactless, painless and radiation-free thermal imaging technology is one of the preferred screening modalities for detection of breast cancer. However, poor signal to noise ratio and the inexorable need to preserve edges defining cancer cells and normal cells, make the segmentation process difficult and hence unsuitable for computer-aided diagnosis of breast cancer. This paper presents key findings from a research conducted on the appraisal of two promising techniques, for the detection of breast cancer: (I) marker-controlled, Level-set segmentation of anisotropic diffusion filtered preprocessed image versus (II) Segmentation using marker-controlled level-set on a Gaussian-filtered image. Gaussian-filtering processes the image uniformly, whereas anisotropic filtering processes only in specific areas of a thermographic image. The pre-processed (Gaussian-filtered and anisotropic-filtered) images of breast samples were then applied for segmentation. The segmentation of breast starts with initial level-set function. In this study, marker refers to the position of the image to which initial level-set function is applied. The markers are generally placed on the left and right side of the breast, which may vary with the breast size. The proposed method was carried out on images from an online database with samples collected from women of varying breast characteristics. It was observed that the breast was able to be segmented out from the background by adjustment of the markers. From the results, it was observed that as a pre-processing technique, anisotropic filtering with level-set segmentation, preserved the edges more effectively than Gaussian filtering. Segmented image, by application of anisotropic filtering was found to be more suitable for feature extraction, enabling automated computer-aided diagnosis of breast cancer.

**Keywords :** anisotropic diffusion, breast, Gaussian, level-set, thermograms

**Conference Title :** ICCVIP 2018 : International Conference on Computer Vision and Image Processing

**Conference Location :** Mumbai, India

**Conference Dates :** February 22-23, 2018