UNIVERSITI TEKNOLOGI MARA

TECHNICAL REPORT

ANISOTROPIC DIFFUSION FILTER FOR REGION ENHANCEMENT IN SEGMENTATION OF BREAST ULTRASOUND IMAGES

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ABSTRACT

Filtering is a process of removing noise in the images without blurring and preserving the boundaries between homogenous regions. It is an essential pre-processing technique before proceeding to the segmentation process. However, filtering had the difficulty of locating the meaningful region and boundaries which causes some severe blurring problems. Therefore, Anisotropic Diffusion Filter (ADF) method was used as the pre-processing technique in order to enhance the region of interest in the breast ultrasound images. ADF is a smoothing technique that controls the diffusion rate by using an edge stopping function to avoid over blurring on the images. Twenty breast ultrasound images were acquired from the radiologist to test the application ADF as an image enhancement technique. In order to evaluate the quality of filtered image, Mean Squared Error (MSE) and Peak Signal-to-Noise Ratio (PSNR) were calculated by comparing ADF with another filtering method which is Integral Filter. The MSE results show ADF has the lowest value of 9.2550 compared to Integral Filter at 49.4672. Whereas, PSNR of filtered image with ADF is 31.3484 higher than Integral Filter, 16.9034. This implies filtered image with ADF has the best quality image compared to Integral Filter. Subsequently, the image segmentation testing on filtered ultrasound images has been done by implementing the Seed Based Region Growing (SBRG) technique. The performance of segmentation results is measured in terms of accuracy based on the percentage relative error obtained by comparing with the area of segmented results without using ADF and with ADF. As a result, the percentage relative error of segmented areas with ADF is 10% which implies the accuracy of 90% while percentage relative error without ADF is 17.05% with an accuracy of 82.95%. Therefore, it is proven that ADF is the best option in enhancing breast ultrasound images and gives improvement to the segmentation process.