UNIVERSITI TEKNOLOGI MARA

SEGMENTING MICROCALCIFICATIONS USING ENHANCED DISTANCE ACTIVE CONTOUR (EDAC)

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CANDIDATE'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the result of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any other degree or qualification.

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ABSTRACT

Advances in computer technology are associated with complex mathematical computation problems. Time factor is normally an issue when applying algorithms to solve such problems. Computationally, segmentation process involves iterations which are time consuming. This study sets out to explore the Active Contour models to segment object boundaries using the Distance Active Contour (DAC) method. This model is then implemented on mammogram images of low contrast where the breast tissues and the breast abnormalities can hardly be differentiated. The main objective of this study is to enhance the DAC to segment microcalcifications in mammogram images. This is followed by the second aim which is to implement the enhanced DAC (EDAC) on mammogram images for segmentation purposes. Finally, the performance of the enhanced DAC is measured. There are four major phases employed in this study. The first phase is the knowledge and data acquisition. This is followed by the second phase which is to enhance the DAC. In this phase, some experiments were carried out on a breast phantom using the EDAC. The third phase involves the implementation of the EDAC on a set of real mammograms. Finally, the performance of EDAC in terms of accuracy and efficiency are measured. The accuracy is measured using Receiver Operating Characteristic (ROC) curve while the efficiency is measured in terms of time lapse. Results obtained show that the EDAC has successfully reduced the processing time. In addition to that, the boundaries of microcalcifications have been successfully segmented by the EDAC. It is also found that the performance of EDAC is better than the DAC.

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CHAPTER 1

INTRODUCTION

1.1 Overview

Nowadays, advances in computer technology are connected with the complex mathematical computation problems. Time factor is an issue when applying algorithm to solve problems having complex mathematical computations. For example, Active Contour (Kass *et al.*, 1987) which is computational in nature has been widely used in many applications of computer vision and image processing. It is composed of computer generated curves that move within images to segment the image boundaries. Segmentation is a process to partition an image into meaningful regions which corresponds to part of, or the whole of object within the scene.

Image segmentation has become increasingly significant and challenging tasks in the medical imaging such as mammogram, Magnetic Resonance Imaging (MRI) and Computed Tomography (CT) over the past two decades. Computationally, segmentation process involves iterations to find the boundary of an image which is also time consuming. Therefore, this research attempts to make some enhancement of the mathematical and computational approaches of solving these problems.