

FUZZY ENTROPY AND MORPHOLOGY BASED FULLY AUTOMATED SEGMENTATION OF LUNGS FROM CT SCAN IMAGES

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ABSTRACT. Segmentation is considered an essential step in medical image analysis and classification. In this paper we describe a method for lung segmentation based on Fuzzy C-Mean (FCM) and morphological image processing techniques. We have incorporated fuzzy entropy for determining optimal, dynamic and adaptive threshold. The proposed system is capable to perform automatic segmentation of CT scanned lung images, based solely on information enclosed by the image itself. The proposed system can be engaged as a basic building block for a computer aided diagnosis systems. The technique was tested against the datasets of different patients received from Aga Khan Medical University, Pakistan.

Keywords: Computer aided diagnosis, Mathematical morphology, Medical image analysis, Segmentation, Thresholding

1. Introduction. Computer Aided Diagnosis (CAD) of lung CT image has been under a significant and innovative development, in the early and untimely detection of lung abnormalities. The CAD systems comprises of systems needed for ‘automatic detection of abnormality nodules’ and ‘3D reconstruction of lung’ systems. Combined together, these systems support the radiologists in their final decisions [2]. The accurateness and higher decision confidence value of any lung abnormality identification system relies profoundly on an efficient lung segmentation technique. It is therefore very important for effective performance of these systems to provide them with entire and perfectly complete lung part of the image. No part of interest that is part of the original image be eradicated.

High-resolution X-Ray computed tomography (CT) is the standard for pulmonary imaging. Pulmonary CT images have been used for applications such as lung parenchyma density analysis [3, 15, 16], airways analysis and nodule discovery for diagnosing early lung cancer. A precursor to all of these quantitative analysis applications is lung segmentation.

Image segmentation is a process of partitioning an image into different objects that compose it. There are several issues related to image segmentation that requires thorough examination. One of the common problems encountered in image segmentation is choosing a suitable approach for isolating different objects from the background. For example in case of Lung CT Scan, segmentation can be performed by the use of excellent contrast between air and surrounding tissues. However, this approach fails when lung is affected