

GENETIC FUZZY BASED AUTOMATIC LUNGS SEGMENTATION FROM CT SCANS IMAGES

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ABSTRACT. Segmentation of images has become an important and effective tool for many technological applications like lungs segmentation from CT scan images, medical imaging and many other post-processing techniques. Lung cancer is one of the leading causes of death in the world. In this paper, a fully automatic un-supervised strategy has been developed for the segmentation of lungs. No prior assumption is made about features, types, contents, stochastic models, etc. of the images. A fuzzy histogram based image filtering technique has been used to remove the noise, which preserves the image details for low as well as highly corrupted images. The proposed technique finds out optimal and dynamic threshold by using genetic algorithms. For edge detection, we have used morphological operators. The proposed system is capable to perform fully automatic segmentation of CT scanned lung images. It can be used as a fundamental building block for a computer aided diagnosis systems. We have tested our technique against the datasets of different patients received from Aga Khan Medical University, Pakistan.

Keywords: Genetic algorithm, Computer aided diagnosis, Mathematical morphology, Thresholding and segmentation

1. Introduction. Lung cancer is one of the leading causes of death in the world. It is very difficult for patients to detect lung cancer symptoms until the cancer is in an advanced stage [1]. The early detection of abnormal lung nodules via computer aided diagnosis of lung CT scan images has been, however, a significant step towards this end. The abnormality nodules can be that of tuberculosis, cancer, pneumoconiosis, infectious and non-infectious granulomas, mucous plugs and hypersensitivity pneumonia. These nodules are situated within the lung parts of the CT scan image that is usually less than half of the area of the CT slice. If nodules have to search in the whole slice, it will take a long time. To reduce time to search nodules in the CT slice, we have to search only in the area where the nodules exist in the CT slice. Therefore a mechanism is needed to segment that part of lung. For this purpose, we have developed a fully automatic method based upon Genetic algorithms and Morphology based image processing techniques to segment that part. After segmenting that part, nodules can be searched only in that segment part of lung. Thus segmentation can be used as a preprocessing step of a CAD.

Segmentation refers to the process of partitioning a digital image into sets of pixels or multiple regions [2,21]. The goal of segmentation is to change the representation of an image into something that is more meaningful and easier to analyze [3,22]. The result of image segmentation is a set of regions that collectively cover the entire image. In a region, each of the pixels is similar with respect to some characteristic such as intensity,