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M. Tanveer · Ram Bilas Pachori *Editors*

Machine Intelligence and Signal Analysis

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Automatic Lung Segmentation and Airway Detection Using Adaptive Morphological Operations

Anita Khanna, N. D. Londhe and S. Gupta

Abstract The respiratory system of lungs contains airway trees. The detection and segmentation of airways is a challenging job due to noise, volume effect and non-uniform intensity. We present a novel automatic method of lung segmentation and airway detection using morphological operations. Optimal thresholding combined with connected component analysis gives good results for lung segmentation. We describe a quick method of airway detection with grayscale reconstruction performed on four-connected low-pass filtered image. The results are quite satisfactory with some error due to non-uniform intensity and volume effect in the CT image.

Keywords Optimal thresholding · Connected component analysis
Four-connected filter · Grayscale reconstruction

1 Introduction

Pulmonary CT scans are used worldwide for diagnosing and treating lung diseases. Lung cancer is the common cause of death both in men and women as per the survey done by American Cancer society [1]. Early detection of the symptoms can help save mankind [2]. Detection of tumor, nodule is quite difficult due to the presence of multiple vascular structures and airways in lung parenchyma. For the purpose of investigation, lung has to be first segmented. Moreover quantification of airways can also help in diagnosis and treatment planning. Airways are the gas exchange structures in lungs and gets narrower as it penetrates deep inside the lung. Detection and segmentation of airways is a challenging task but can help in detecting pulmonary diseases.

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