

Recurrent Fully Convolutional DenseNet for Bronchiectasis Detection in CT Imaging

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Bronchiectasis, one of several features of Chronic Obstructive Pulmonary Disease (COPD), which is the 4th leading cause of death worldwide, represents an abnormal, often irregular widening of the bronchial airways. It is present in more than 25% of COPD patients and is associated with more severe obstruction and more frequent hospital admissions, therefore accurate bronchiectasis detection is useful in risk stratification and population health management. In this article we propose a Recurrent Fully Convolutional DenseNet architecture for a fully-automated detection of bronchiectasis in CT scans. Convolutional and recurrent layers are combined to learn expressive image representations exploiting the spatial dependencies across axial slices. The network is able to learn not only to locate airways, but also to estimate broncho-arterial ratios in order to decide which bronchi are abnormal. We show that performance of the network improves with increasing numbers of adjacent slices as input.