

# Ground Glass Opacity Detection Using Fully Convolutional Neural Networks

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Ground Glass Opacity (GGO) is a radiologic feature which appears as a hazy region with vague boundaries on Chest Computed Tomography (CT) scans. GGO is a non-specific sign seen in various pathologies, most commonly: alveolar inflammation, infection, hemorrhage, edema or cancer. Relative to more discreet findings, GGO is often considerably more subtle and thus overlooked. We present an automated method for detection of GGO in CT scans based on a Fully Convolutional Neural Network. We utilized segmentation of axial CT reconstructed images to reduce the number of CT studies required as training data in order to obtain high accuracy of GGO detection (96.9%) using a Deep Learning technique. We explore two architectures of Fully Convolutional Neural Networks: U-Net and Fully Convolutional DenseNet. DenseNet-like network is first applied to the Medical Imaging domain and achieves superior detection accuracy due to a higher layer connectivity within a network. We report results of GGO binary classification per axial slice and measurement of slice segmentation goodness (Dice score). The algorithm is constructed to be applicable to any Chest CT scan, allowing for variations in data acquisition protocols such as inspiration/expiration imaging and technical acquisition variations which may result in the appearance of the lung tissue.