Lung cancer Computer-Aided Diagnosis System (CADx) with 3D deep convolutional neural networks

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In this work, we present the development and evaluation of a computer-aided diagnostics system designed to enhance lung cancer screening. We employ advanced image analysis techniques, specifically 3D Convolutional Neural Networks (CNNs), to facilitate the segmentation and classification of pulmonary nodules in low-dose CT (Computed Tomography) images.

The early detection of lung cancer is of paramount importance, and this work aims to contribute by automating image analysis to assist radiologists. Our investigation extensively explores the capabilities of 3D CNNs in nodule segmentation and classification. We utilize a publicly available dataset of low-dose CT images to train our model, enabling it to discern intricate spatial features necessary for precise nodule segmentation. Furthermore, we meticulously fine-tune the classification capabilities to distinguish benign from malignant nodules.

The results demonstrate significant promise, as the integration of 3D CNNs improves nodule segmentation, yielding accurate 3D predictions. Moreover, our classification performance advances the accurate identification of malignant nodules, thereby assisting in making informed clinical decisions.

In summary, this work constitutes a valuable contribution to the field of computer-aided diagnostics. By introducing a novel approach to lung cancer screening utilizing 3D CNNs, our findings underscore the potential of the developed system as an essential tool for radiologists. This system has the potential to streamline the detection and classification of pulmonary nodules in low-dose CT images, ultimately aiding in the early detection of lung cancer.

Keywords: computer-aided diagnostics, lung cancer screening, 3D CNN, nodule segmentation, nodule classification, low-dose CT images