

عنوان مقاله:

Automatic Chest CT Image Findings of Novel Coronavirus Pneumonia (COVID-19) Using U-Net Based Convolutional Neural Network

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خلاصه مقاله:

The continuing outbreak of COVID-19 pneumonia is globally concerning. Timely detection of infection ensures prompt quarantine of patient which is crucial for preventing the rapid spread of this contagious disease and also supports the patient with necessary medication. Due to the high infection rate of COVID-19, our health management system needs an automatic diagnosis tool that equips the health workers to pay immediate attention to the needy person. Chest CT is an essential imaging technique for diagnosis and staging of 2019 novel coronavirus disease (COVID-19). The identification of COVID-19 CT findings assists health workers on further clinical evaluation, especially when the findings on CT scans are trivial, the person may be recommended for Reverse-transcription polymerase chain reaction (RT-PCR) tests. Literature reported that the ground-glass opacity (GGO) with or without consolidation are dominant CT findings in COVID-19 patients. In this paper, the U-Net based segmentation approach is proposed to automatically segment and analyze the GGO and consolidation findings in the chest CT scan. The performance of this system is evaluated by comparing the auto-segmented infection regions with the manually-outlines ones on 100 axial chests CT scans of around 40 COVID-19 patients from SIRM dataset. The proposed U-Net with pre-process approach yields specificity of 0.91 ± 0.09 and sensitivity of 0.87 ± 0.07 on segmenting GGO region and specificity of 0.81 ± 0.13 and sensitivity of 0.44 ± 0.17 on segmenting consolidation region. Also the experimental results confirmed that the automatic detection method identifies the CT finding with a precise opacification percentage from the chest CT image.

کلمات کلیدی:

Covid-19, CT imaging findings, Segmentation, Deep learning, Ground-glass opacities, U-Net

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