A Study of Detecting COVID-19 Severity using Lung Ultrasonography

Team C

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Abstract

In the wake of the COVID-19 pandemic, some work has begun investigating machine-learning solutions for the assisted diagnosis of lung diseases. While existing work focuses on CT scans, this project studies the application of deep learning techniques to analyze lung ultrasonography (LUS) images. Specifically, we present a novel, fully annotated dataset of LUS images collected from hospitals. We leverage these data to introduce several learning models that address related tasks for automatically analyzing LUS images [1]. *In precise, we present a novel deep network derivation that simultaneously predicts a disease severity score.*

Introduction:

The rapid global spread of SARS-CoV-2 has resulted in shortages of medical equipment. However, widespread testing and diagnosis are vital to control the epidemic effectively. Indeed, countries that have achieved large-scale testing of infected individuals combined with massive citizen surveillance have significantly controlled the SARS-CoV-2 virus. Insufficient testing capacity in many countries has increased the search for and need for alternative methods to diagnose COVID-19. Covid-19 pneumonia can rapidly progress to a severe condition. An examination of radiological images of more than 1,000 COVID-19 patients found a very severe respiratory distress syndrome. Chest computed tomography (CT) has been proposed as a potential alternative for diagnosing COVID-19 patients [2]. Ultrasound imaging, a more widely available, cost-effective, safe, and real-time imaging technique, is gaining attention. In particular, lung ultrasound (LUS) is increasingly used in point-of-care settings to diagnose and manage acute respiratory disorders [3].

Automatic image analysis by machine and deep learning methods has shown promise for the reconstruction, classification, regression, and segmentation of tissues using ultrasound images. In this project, we describe the use of deep learning to assist clinicians in identifying COVID-19-associated imaging patterns at the point of care for LUS.

Methods:

Here we are using existing data having collection of Lung ultrasound imagery data from various hospitals labeled according to the degree of the disease at the frame and pixel levels.

Conclusion:

In conclusion, we used deep learning and ultrasound imaging to predict the severity of COVID-19. The combination of these technologies has allowed for accurate and efficient diagnosis of COVID-19, which is crucial for the timely treatment and management of the disease. However, more research is needed to validate these findings and develop standardized protocols for ultrasound imaging and analysis in COVID-19 patients. In addition, these technologies must be balanced with ethical considerations such as patient confidentiality and the potential for algorithmic bias.

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