Deep learning-based model for detecting 2019 novel coronavirus pneumonia on high-resolution computed tomography: a prospective study.

Reports of a new Coronavirus disease were made on China in december, 2019. The way with the virus manifests itself is not yet well-known, but its symptoms are usually fever, cough, etc. The favored technique  for diagnosing the coronavirus(COVID19) pneumonia is Computed-Tomography imaging method.

For the detection of the virus, the researchers designed a deep learning model, that diminishes the radiologists’ amount of work; over forty-six thousand images, from confirmed patients with the virus, were used to train the model: it was, posteriorly, tested on a group of confirmed patients to compare its efficiency. The amount of cases reported in February 14th at Wuhan and its surrounding cities were almost fifteen thousand cases, which, compared to the number of radiologists in these cities, is much higher; and, by that, the radiologists can’t supply the demand, thus, increasing the diagnosing delay and slowing the isolation of patients. The deep learning algorithm can help with the diagnosis process, once it diagnoses with less time and performs it with the experience of an expert.

The data used to train the model came from the Hospital of Wuhan University, all Computing-Tomography images collected were filtered to select those images with good lung fields, then, they were divided into a testing set and a training set, this covered nearly all COVID19-Pneumonia Computed-Tomography features. After the previously mentioned step, experienced radiologists, concordantly, labeled the image features on the training dataset and joined labels from both sets. The algorithm used the UNet++ architecture within Keras to detect suspicious regions and spots in the CT images, raw images’ valid areas were filtered from those invalid to reduce false positive: five metrics(sensitivity and accuracy for example) were used to test the algorithm’s performance. To evaluate the algorithm’s efficiency, a 30-year-experienced radiologist was assigned to read all enrolled patients’ CT images, its time was recorded to be compared with the model’s performance time; the results of both were reviewed by another radiologists.

The model had an accuracy of 95.24% per patient. The expert identified sixteen of the total patients as having the disease, while the model identified all of those patients diagnosed by the expert and another two patients of the remaining total. According to the radiologists’ results standard, the model reached a sensitivity of 100% per patient. The model average prediction time was 41.34 seconds per patient: the expert radiologist took an average time to diagnose of 116.12 seconds. The expert used the model to identify the cases posteriorly, its average time was reduced by 65%. With the results obtained, it is provable that the model would have a positive effect on the fight to stop the virus contamination by aiding radiologists reduce the time spent to diagnose patients, therefore, evading an increase in waiting lines and the delay to diagnose.