Developing a Training Web Application for Improving the COVID-19 Diagnostic Accuracy on Chest X-ray

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Abstract
In December 2019, a new coronavirus known as 2019-nCoV emerged in Wuhan, China. The virus has spread globally and the infection was declared pandemic in March 2020. Although most cases of coronavirus disease 2019 (COVID-19) are mild, some of them rapidly develop acute respiratory distress syndrome. In the clinical management, chest X-rays (CXR) are essential, but the evaluation of COVID-19 CXR could be a challenge. In this context, we developed COVID-19 TRAINING, a free Web application for training on the evaluation of COVID-19 CXR. The application included 196 CXR belonging to three categories: non-pathological, pathological compatible with COVID-19, and pathological non-compatible with COVID-19. On the training screen, images were shown to the users and they chose a diagnosis among those three possibilities. At any time, users could finish the training session and be evaluated through the estimation of their diagnostic accuracy values: sensitivity, specificity, predictive values, and global accuracy. Images were hand-labeled by four thoracic radiologists. Average values for sensitivity, specificity, and global accuracy were.72,.64, and.68. Users who achieved better sensitivity registered less specificity ($p < .0001$) and those with higher specificity decreased their sensitivity ($p < .0001$). Users who sent more answers achieved better accuracy ($p = .0002$). The application COVID-19 TRAINING provides a revolutionary tool to learn the necessary skills to evaluate COVID-19 on CXR. Diagnosis training applications could provide a new original manner of evaluation for medical professionals based on their diagnostic accuracy values, and an efficient method to collect valuable data for research purposes.

Author keywords
Chest X-ray
COVID-19
Diagnostic accuracy values
Medical application
Medical education
Training on diagnosis