# How to Support a National Network for COVID-19 Identification in Medical Imaging Studies?

The current COVID-19 pandemic has reinforced the need for more agile technical solutions that can quickly support researchers and clinical practitioners in diagnostics and treatments. Sharing data and knowledge is the key driver that can dramatically change the efficiency of political and health care decisions. Chest x-ray has been the main imaging method to diagnose the COVID-19 infection, but the sharing of these images can be hindered by the absence of vendor-neutral archives and web viewers.

Given the severity of the current situation and the awareness of the importance of medical imaging within the COVID-19 pathology, BMD Software (www.bmd-software.com) is partnering with hospitals and research institutions to bring together anonymized medical imaging repositories within this pathology, with the aim of creating research studies that may lead to the development of discoveries and support the diagnostic process. Using a Web-browser, radiologists are able to submit and annotate the images, with the studies being automatically anonymized by the platform. Researchers are then able to view, search and export data to train the automatic diagnostic solution.

To support this scenario, the PACScenter platform uses the latest web technology (zero-footprint) to transform a common web browser (Chrome, Safari, Firefox, etc.) into a professional workstation with a similar performance as when compared to desktop solutions. It supports the breast cancer screening program in Portugal and several regions of Germany, and an installation for academy in the leading European teleradiology services. Moreover, it has already been accessed from users of about one hundred countries.

The most recent application of a teleradiology platform that is supported by PACScenter, is currently in place in Kazakhstan and it is being used for COVID-19 identification in medical imaging studies (Figure 1). The platform was easily integrated with iMedHub (imedhub.org), a decision support system that provides national services for hospitals and doctors helping the remote diagnosis of lung diseases. Anyone can upload an x-ray of the lungs and get a neural network diagnostic result in a few seconds. During the fight against coronavirus, this tool was integrated with the PACScenter platform and it is being used in the largest coronavirus control hospitals in Almaty, Kazakhstan (The State Clinical Infectious Diseases Hospital).
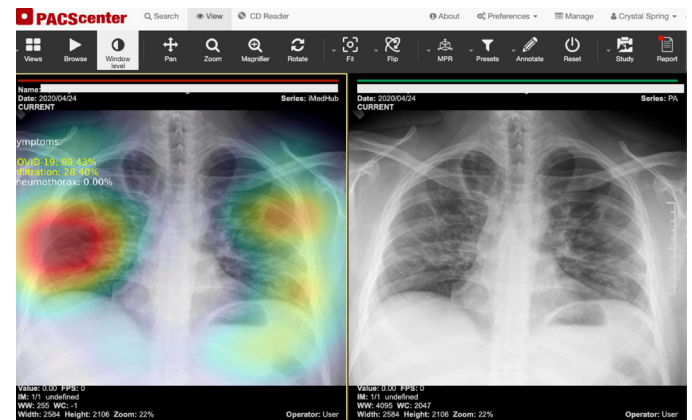
The acquired x-ray images are transferred to the PACScenter, after which they are automatically analyzed by the neural network, and the result is stored back into the PACS in the form of a new DICOM study with a heat map and the detected symptoms. This process is completely transparent for the physicians, who are able to compare the original image and the diagnostic result, simplifying the diagnosis and the dynamics of the disease. On the third day of using the solution, all the hospital's doctors confirmed that the diagnostic process is many times faster, which, in the current situation of physical lack of time, is a lifeline for them. At the moment, the service can detect 14 symptoms of lung diseases and differentiate COVID-19-specific pneumonia.

Clearly, the world wide population must learn to live in a different way. In the next few years, we believe that technology, a wider digitization, and paper/film free solutions will play a more significant role in the context of healthcare services. Telemedicine solutions will not only provide remote consultancies and diagnostics but also help to promote data sharing for research. ■

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