HealthManagement
Promoting Management and Leadership

COVID-19 Imaging and Artificial Intelligence

A new position paper provides a collection of views on the role of Artificial Intelligence (AI) in the COVID-19 pandemic. The paper discusses clinical tools, the design of AI-based systems and the application of these tools in the clinic. Factors in designing system solutions are also discussed. The authors focus on three specific use cases for which AI systems can be designed. These include early disease detection, management of the disease in a hospital setting and building patient-specific predictive models.

Imaging has played an important role in the fight against COVID-19 - from screening to diagnosis to treatment. However, since the coronavirus disease is still poorly understood, guidelines and diagnostic profiles are still being defined. Nevertheless, computed tomography (CT) of the thorax has proven to be an important tool in diagnosing and tracking the progress of COVID-19 patients. Several countries, including China, Russia, the Netherlands and others, have used CT as a primary imaging modality. Countries like the US and Denmark and countries in Southeast Asia and Africa are using conventional radiographic imaging of the chest (CXR).

Since the pandemic has pushed healthcare to pull out all its ammunition, AI and deep learning approaches have also become important tools during this fight. AI solutions can support radiologists in the triage, quantification and trend analysis of patient data. These solutions can also allow clinicians to analyse multiple cases in parallel to detect whether the Chest CT or CXR reveal any abnormalities. If the AI software indicates that there is a greater likelihood of disease, the case can be further reviewed. This can thus help in making the detection process more efficient as well as improve infection control.

AI tools are also useful for predictive analysis because they allow foreseeing events and ensuring timely intervention. Predictive AI can be applied on three levels - the individual, the hospital and the society. At the individual level, AI can be used to compute risk based on location, comorbidities, health records, risk of ARDS and risk of mortality. This can help guide testing, intervention, hospitalisation and treatment. At the hospital level, AI can be used to optimise workflows by automating radiologists' interpretation and by forecasting the future need for healthcare resources such as a bed in the ICU or a ventilator. At the societal level, AI can be used to forecast capacity needs and help in assessing when there is a need for lockdowns and when things can be reopened.

Since imaging is playing a unique role in the clinical management of COVID-19, the use of AI to augment imaging quality can play a crucial role. During this time, there has been increased adoption of AI-based imaging approaches and the use of prototyping imaging solutions that can be deployed in a healthcare setting. These deployments are through cloud-based computing architectures and web-based technologies. Many apps have also been developed, such as the Convictory App and the Coronavirus Xray app.

For the first time in history, we are faced with a disease with unique imaging and clinical characteristics and fast global spread. It has created unique challenges and opportunities, one of which is AI and its application in clinical imaging.

Source: Medical Image Analysis

Image Credit: iStock

Published on : Wed, 7 Oct 2020