

LEKHASREE NARAYANAGARI

STUDENT, MASTER OF SCIENCE IN
INFORMATION TECHNOLOGY

EVALUATION AND DEVELOPMENT OF ARTIFICIAL INTELLIGENCE TOOLS TO ASSESS COVID-19 SEVERE ACUTE RESPIRATORY SYNDROMES FROM CHEST IMAGING

Most attention has been paid to chest Computed Tomography (CT) in this burgeoning crisis because many cases of COVID-19 demonstrate respiratory illness clinically resembling viral pneumonia which persist prominent visual signatures on high-resolution CT befitting of viruses that damage lungs. However, CT is very expensive, time consuming, and inaccessible in remote hospitals. As an important complement, and spurred by the breakthrough success of Deep Learning (DL) in the are of computer vision in recent times, this research investigates that DL based Artificial Intelligence (AI) tools would enable to triage patients by automatically excavating COVID-induced pneumonia from inexpensive and simple frontal chest X-ray (CXR) and respiratory biomarkers (visual imaging phenotypes) on CXR accountable for developing severe acute respiratory syndrome who need scarce medical resources such as hospital beds, ICU, ventilators, and thus help to manage the pandemic. Using AI tool, emergency doctors can get an initial reading and enhance their own

abilities to spot subtle pneumonia on CXR which is often challenging to be noticed by naked eye and later can be verified by radiologists. We conducted the experiments on two well known DL architectures: Convolutional Neural network (CNN) and VGG-19. Extensive experimental results demonstrate that AI tool can excavate respiratory biomarkers from CXR which is as accurate as radiologists.

This research will allow OEM healthcare industries in Canada to embed AI platform in their existing imaging system. This research has long-lasting outcomes to use as a routine diagnostic procedure during post-pandemic period for evaluating lung respiratory infections beyond COVID-19 such as seasonal flu, Influenza and asthma from CXR. Once developed, the new AI model could be piloted even in rural hospital settings with an aim to embedding it in routine diagnostic procedures which would provide emergency doctors more confidence to examine CXR.

Research Advisor: Dr. Baidya Nath Saha