

## **COVID-19 detection using deep learning classifiers and contrast-enhanced canny edge detected x-ray images**

### **ABSTRACT**

COVID-19 is a deadly disease, and should be efficiently detected. COVID-19 shares similar symptoms with pneumonia, another type of lung disease, which remains a cause of morbidity and mortality. This article aims to demonstrate an ensemble deep learning approach that can differentiate COVID-19 and pneumonia based on chest X-ray images. The original X-ray images were processed to produce two sets of images with different features. The first set was images enhanced with contrast limited adaptive histogram equalization. The second set was edge images produced by contrast-enhanced canny edge detection. Convolutional neural networks were used to extract features from the images and train classifiers, which were able to classify COVID-19, pneumonia, and healthy lungs cases. Results show that the classifiers were able to differentiate X-rays of different classes, where the best performing ensemble achieved an overall accuracy of 97.90%, with a sensitivity of 99.47%, and specificity of 98.94% for COVID-19 detection.