

COVID-19 Detection using Deep Learning Classifiers with Histogram Equalization and Contour-Based X-Ray Images

ABSTRACT

The global health crisis caused by COVID-19 has significantly impacted both lifestyle and healthcare. Accurate and prompt medical diagnosis is crucial in combating the spread of the disease. However, the time required for laboratory interpretation and the high cost of a Computed Tomography (CT) scan can lead to inaccurate predictions of this disease. Several existing works have addressed this issue by using the Chest X-ray (CXR) images, however, achieving high accuracy is still a challenge in this domain. In this paper, features extracted from various modified CXR images that could produce more informative features, coupled with deep learning architectures, were evaluated to address the accuracy issue. First, the original CXR images were preprocessed and generated two subsequent different sets: the enhanced CXR images using histogram equalisation and the CXR contour images using contour-based methods. VGG16, InceptionV3, and Xception were used as feature extractors and classifiers; trained on public datasets to classify the CXR images into three categories: health, pneumonia, and COVID-19. The results demonstrate that the proposed work is able to accurately differentiate CXR images based on their respective classes. The best individual model was trained using InceptionV3 with histogram equalisation, achieving an accuracy of 98.25%.