ABSTRACT

Given the disease's rapid spread, detecting coronavirus disease 2019 (COVID-19) is currently one of the world's most difficult tasks. According to recent research, the number of people diagnosed with COVID-19 is geometrically expanding, with over 1.6 million confirmed cases; the virus is spreading too far to many countries around the world. COVID-19 is a new virus that infects the upper respiratory tract as well as the lungs.

The entire world is putting out great efforts in infrastructure and basic, financing, data sources, protective gear, life-risk treatments, and a variety of other resources to combat the spread of this fatal disease. On the scale of a global pandemic, the number of illnesses and deaths has been increasing daily. Chest X-ray images have lately been utilized to monitor the COVID-19 disease, which has proven to be beneficial for monitoring a variety of lung disorders. This thesis focuses on establishing some novel deep learning-based algorithms for enhancing the accuracy of covid-19 prediction, segmentation, and classification.

The principles necessary for understanding Covid-19, as well as deep learning algorithms for Covid-19 prediction, segmentation, and classification, are covered in detail in the introduction. The present technical underpinning of COVID-19 is described in the literature review.

The first study used Lung contour classification and DeepLab v3+ to predict COVID-19 from chest X-ray images. Using a high boost filter and adaptive histogram equalization approaches, the proposed model is used to pre-process the chest x-ray input pictures. The enlarged and filtered images are then subjected to a lung contour segmentation procedure. The illness in

the lungs is segmented using the Efficient Net approach, and the segmented images are then used in the multi-class classification process. The DeepLab v3+ approach was used to classify this multi-class classification as normal, covid-19, and pneumonia.

Lung lobe segmentation and feature extraction based Hierarchical Attention Network for COVID-19 prediction from chest X-ray images is the subject of the second study. In the medical healthcare system, accurate early identification of covid-19 is a difficult task. This chapter created an excellent approach for detecting covid-19 at an early stage called MRMVO-based HAN. The ROI extraction-based thresholding model is used to pre-process the input chest X-ray picture. The optimal interested region is identified at this point, and the lung lobes are segmented using BFC. Texton features are used to obtain features related to segmented results once the interested lung areas have been segmented. Finally, the covid detection process is carried out by the HAN classifier, which is trained using the proposed MRMVO algorithm. As an outcome, the Manta Ray Foraging Optimization (MRFO) and Multi-Verse Optimizer were combined to form the MRMVO (MVO)

Keywords: Deep learning, Prediction, COVID-19, HAN classifier, MRMVO algorithm, DeepLab v3+, Efficient Net, Chest X-ray images.