

# Unsupervised deep learning based variational autoencoder model for COVID-19 diagnosis and classification

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## Abstract

At present times, COVID-19 has become a global illness and infected people has increased exponentially and it is difficult to control due to the non-availability of large quantity of testing kits. Artificial intelligence (AI) techniques including machine learning (ML), deep learning (DL), and computer vision (CV) approaches find useful for the recognition, analysis, and prediction of COVID-19. Several ML and DL techniques are trained to resolve the supervised learning issue. At the same time, the potential measure of the unsupervised learning technique is quite high. Therefore, unsupervised learning techniques can be designed in the existing DL models for proficient COVID-19 prediction. In this view, this paper introduces a novel unsupervised DL based variational autoencoder (UDL-VAE) model for COVID-19 detection and classification. The UDL-VAE model involved adaptive Wiener filtering (AWF) based preprocessing technique to enhance the image quality. Besides, Inception v4 with Adagrad technique is employed as a feature extractor and unsupervised VAE model is applied for the classification process. In order to verify the superior diagnostic performance of the UDL-VAE model, a set of experimentation was carried out to highlight the effective outcome of the UDL-VAE model. The obtained experimental values showcased the effectual results of the UDL-VAE model with the higher accuracy of 0.987 and 0.992 on the binary and multiple classes respectively.

## Keywords

COVID-19, Deep learning, Unsupervised learning, Variational autoencoder. Image classification