

## Detection of COVID-19 Cases From X-Ray Images Using Capsule-Based Network

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**Abstract :** Coronavirus (COVID-19) disease has spread abruptly all over the world since the end of 2019. Computed tomography (CT) scans and X-ray images are used to detect this disease. Different Deep Neural Network (DNN)-based diagnosis solutions have been developed, mainly based on Convolutional Neural Networks (CNNs), to accelerate the identification of COVID-19 cases. However, CNNs lose important information in intermediate layers and require large datasets. In this paper, Capsule Network (CapsNet) is used. Capsule Network performs better than CNNs for small datasets. Accuracy of 0.9885, f1-score of 0.9883, precision of 0.9859, recall of 0.9908, and Area Under the Curve (AUC) of 0.9948 are achieved on the Capsule-based framework with hyperparameter tuning. Moreover, different dropout rates are investigated to decrease overfitting. Accordingly, a dropout rate of 0.1 shows the best results. Finally, we remove one convolution layer and decrease the number of trainable parameters to 146,752, which is a promising result.

**Keywords :** capsule network, dropout, hyperparameter tuning, classification

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