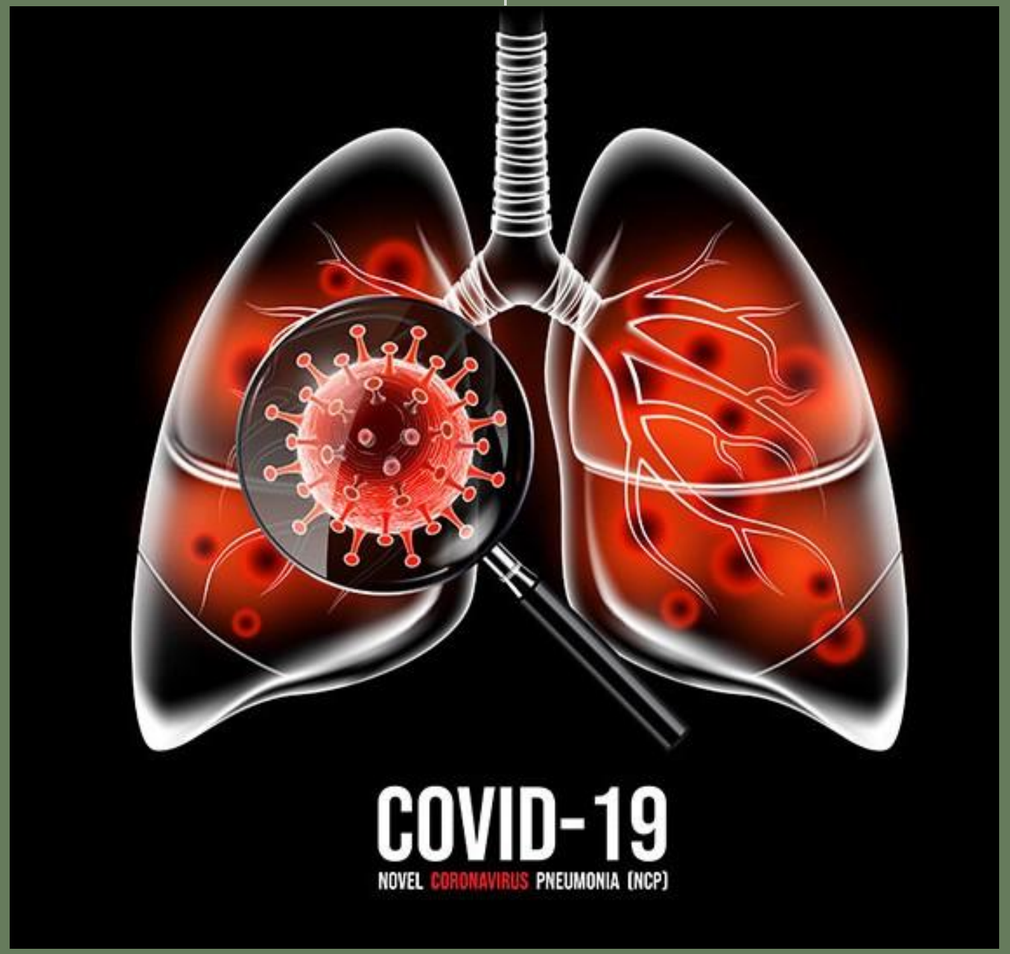
COVID19-DETECTION USING X-RAY (USING CNN)



Introduction

The CoronaVirus Disease (COVID-19) is caused by Severe Acute Respiratory Syndrome Coronavirus 2 (SARS- CoV-2) and is highly transmissible. It came into China government's notice in December, 2019 in Wuhan and more than twenty five million people all over the world were affected by it. Coronavirus is challenging all the people and the technology on the entire planet. As of August 2022, there are more than 27 million COVID-19 cases and 873 deaths globally .People with low immunity, old age, and medical issues especially associated with lungs COVID-19 sickness. The symptoms of COVID-19 are cough, cold, high fever and respiration issues. Preventive measures for COVID-19 square m measure to shield oneself by washing hands off, avoid touching mouth, eyes, nose and face, and by maintaining social distance with others.

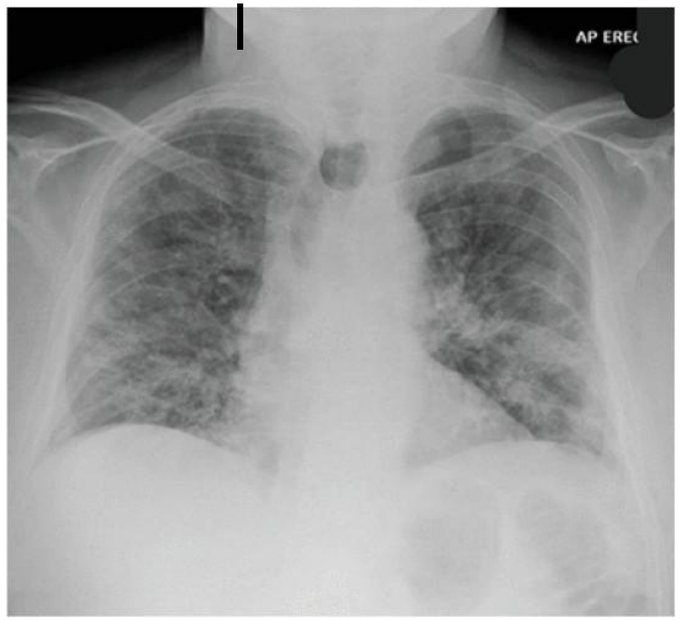
As RT-PCR tests take longer time for prediction, medical practitioners express that quick and early detection from clinical tests of X-rays can help to decide whether the patient is to be kept in observation by isolation until the laboratory test results come. This early prediction from X-rays prevents fast spreading of the disease to others during that gap. The chest X-ray observation is a discriminating factor; if the chest X-ray image is normal, patients can go home and wait for the laboratory test results. That's where the significance of our work carried out in this paper lies. Significant research has been carried out in applying machine Learning for automatic identification of diseases and has recently gained quantity and quality. Deep learning techniques are widely used in medical problems like carcinoma detection, carcinoma classification, and respiratory disorder detection from chest x-ray pictures.

Deep learning typically uses convolutional neural networks (CNN) in depth for feature learning automatically, using that knowledge for classification. A deep learning model using transfer learning is proposed in this paper for automatic and fast identification of COVID-19. This proposed deep learning model needs images of chest x-ray to come out with the identification of COVID. In the training phase, the model is trained with more than a thousand chest x-ray images. As we are having a small size of the COVID-19 samples, transfer learning is better suited to train the deep CNNs and the results presented in this paper demonstrate the same.

Methodology

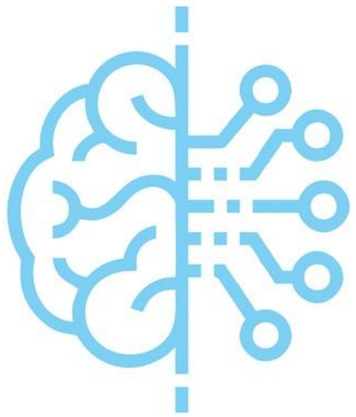
The methodology used is transfer learning which is a deep learning technique. We used the GoogleNet model of transfer learning. The data set used for this is a public dataset available [9]. This data set consists chest xray images of both COVID-19 and normal patients, in which there are 912 x-ray images of each correspondingly .Below figures (a) and (b) shows the sample chest x-rays of both COVID-19 and normal patients. The distinct observations from X-ray images of COVID-19 infected from the other X-rays are the lower lobes, and the posterior segments, with a fundamentally peripheral and subpleural distribution. These observations are evident in both the lungs even in the early stages. Deep learning models use artificial neural networks arranged in multiple layers. The layers are composed of nodes called perceptrons. A node takes inputs from the information with respective coefficients or weights that amplify or dampen the inputs, thereby distributing amplified/dampened inputs to output nodes. The structure of the network and nodes in the network can be varied with reference to the task.

Normal

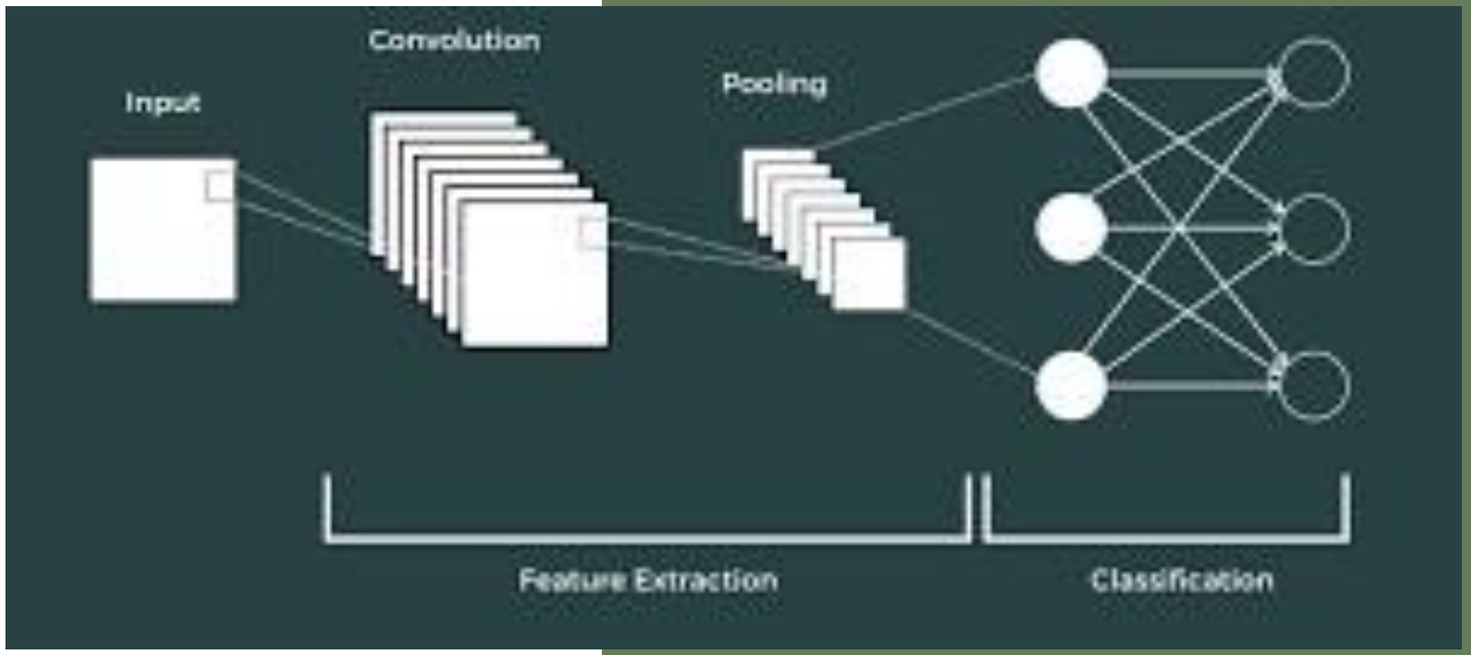


Affected

CNN

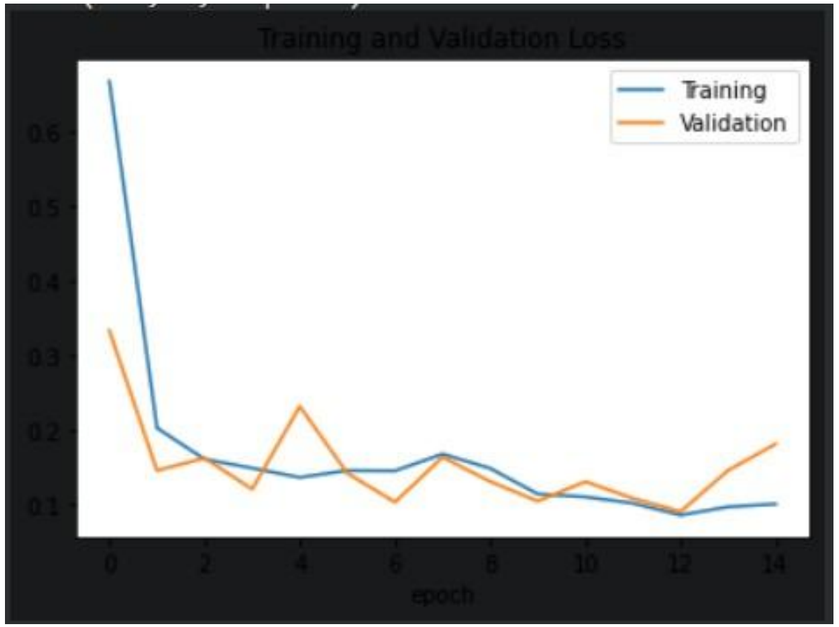


A Convolutional Neural Network (CNN) a type of artificial neural network operates on the principle of convolution. It consists of an input layer, followed by multiple hidden convolution layers. These convolution layers convolve the input matrix with a kernel or filter. Convolution operation can be described by overlapping the filter on the input layer and a dot product of two. The result of convolution is fed to the activation function to perform nonlinear transformation. Then it is fed to additional convolution layers or pooling layers to reduce the size, if required fully connected layers and normalization layers. All these layers are referred to as hidden because they reside in between input and output layers and are not visible to the external systems.

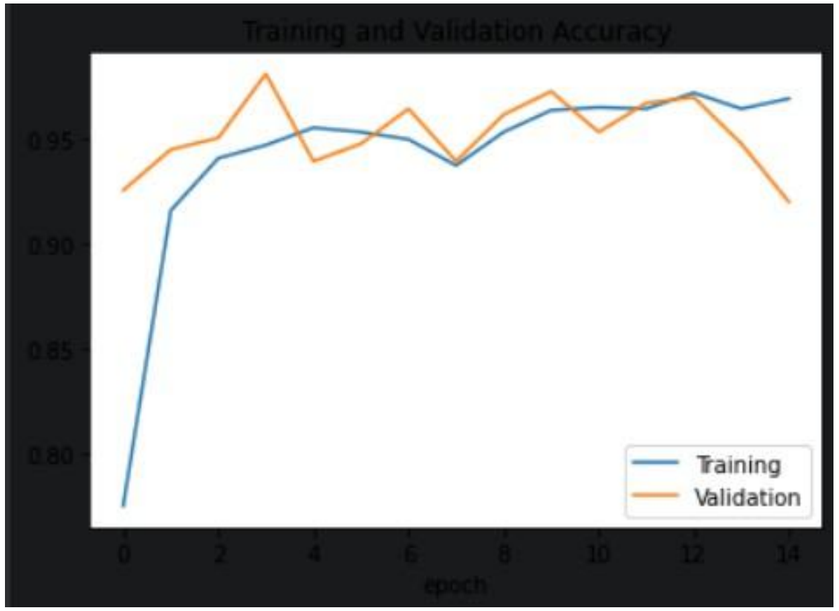


Accuracy=0.9483

Loss=0.1359



TRAINING LOSS VS VALIDATION LOSS



TRAINING ACCURACY VS VALIDATION ACCURACY

Thank you!