Detection of Covid-19 based Pneumonia from Patient's X-Ray & CT Scans using Image Recognition

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Abstract
COVID-19 is caused by a new strain of coronavirus which is a highly contagious disease which is also known as Sars-Cov2. Within a year (by January 2021), it infected 86million human population worldwide and around 1.8 million have died. Tracking suspected people and restricting contact with others is very helpful in handling the COVID-19 pandemic. This application assists people in providing them a safe and secure location proximity tracking service and calculates an Infection Variable (IV) score based on the data given by the user. The proposed system uses a mobile application to receive data from the user for the calculation of IV, depending on the user's IV score their location is then safely stored in a decentralized fashion

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I. INTRODUCTION

In recent years i.e. from 2020 whole world is facing the pandemic i.e. COVID-19 and many people have lost their lives due to COVID-19. In the 21st century, machine learning and artificial intelligence have reached great heights. There are different medical ways to detect if someone is suffering from COVID, but there were fewer testing kits available and most of the people were not getting tested due to a shortage of test kits. So we developed a machine learning model through which we can detect if a person is COVID positive or not. Image recognition at higher accuracy is possible now because of this new technology. Computers can easily recognize different types of images and have the potential to train at high accuracy. We have used this technology to our advantage for training the model to recognize if a patient has Covid or not. We have trained 2 different ML models on X-Ray and CT scans of Chest images of infected people. After training, we got around 87% accuracy for X-Ray and 93% for CT-Scan which is highly reliable. We used the Convolutional Neural Network (CNN) in building the model using the Tensor-Flow framework in python. The data was trained for around 3000 epochs and got high accuracy on CT Scan Images classification. The validation accuracy was also 93% on the same.

II. SYSTEM DESIGN

System Design Our proposed deep learning-based COVID-19 detection comprises several phases. The phases are summarized in the following five steps: Collect the chest X-ray images for the dataset from COVID-19 patients and healthy persons. Collect the chest CT-scans images for the dataset from COVID-19 patients and healthy persons. Represent the images in a feature space and apply deep learning. Split the dataset into two sets: a training set and a validation set. Evaluate the performance of the detector on the validation dataset
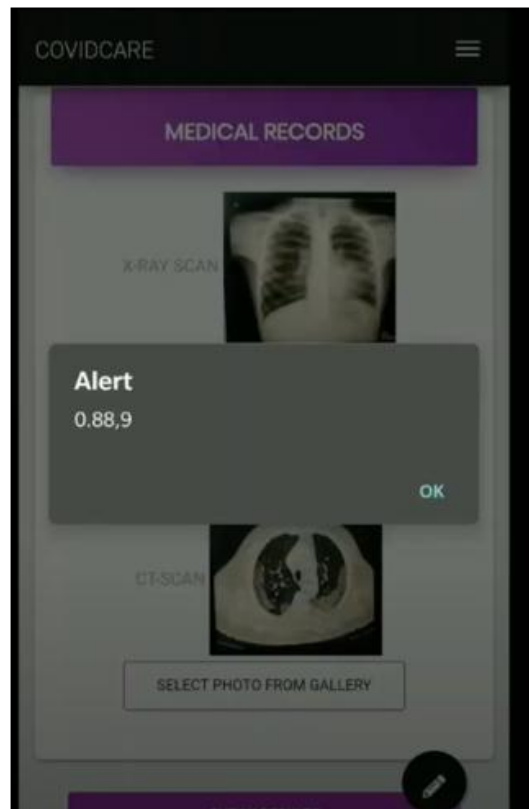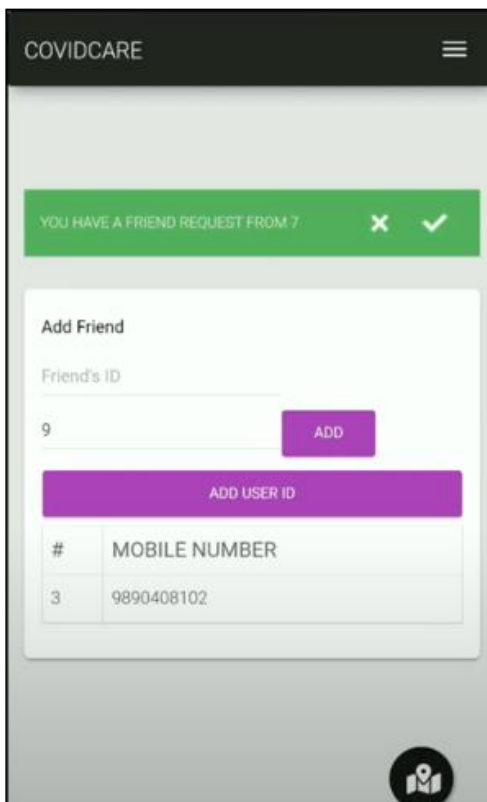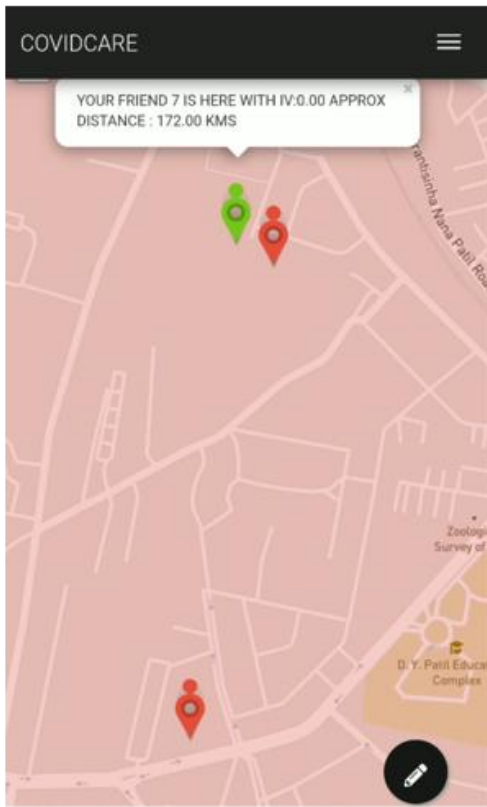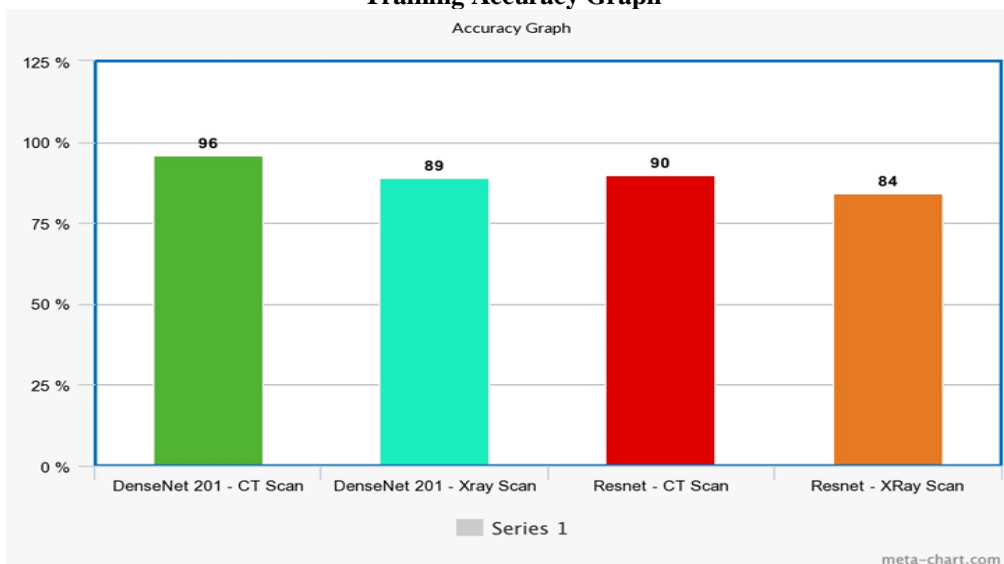

III.   CONVOLUTIONAL NEURAL NETWORK (CNN)

CNN plays a significant part in computer vision-related examples in recognizing patterns, on account of its less computation cost and spatial extraction ability. CNN utilizes convolution portions to combine with the primary images to remove top-level features. The commencement network that is proposed in [9] permits the network to get familiar with the mix of kernels. Planning to build a good Convolutional Neural Network architecture remains a primary inquiry. To prepare a further neural network, K. He et al. proposed Residual Network (Res Net) [10] that can take in personality planning from the last layer. As article locators are generally conveyed on portable or any embedded device, where the computing assets are extremely restricted, Mobile Network (Mobile Net) [11] is proposed. This utilizes profundity shrewd convolution to remove highlights and channelized convolutions to change channel numb. The computational expense of the Mobile Net is a lot lower than networks utilizing standard convolutions.
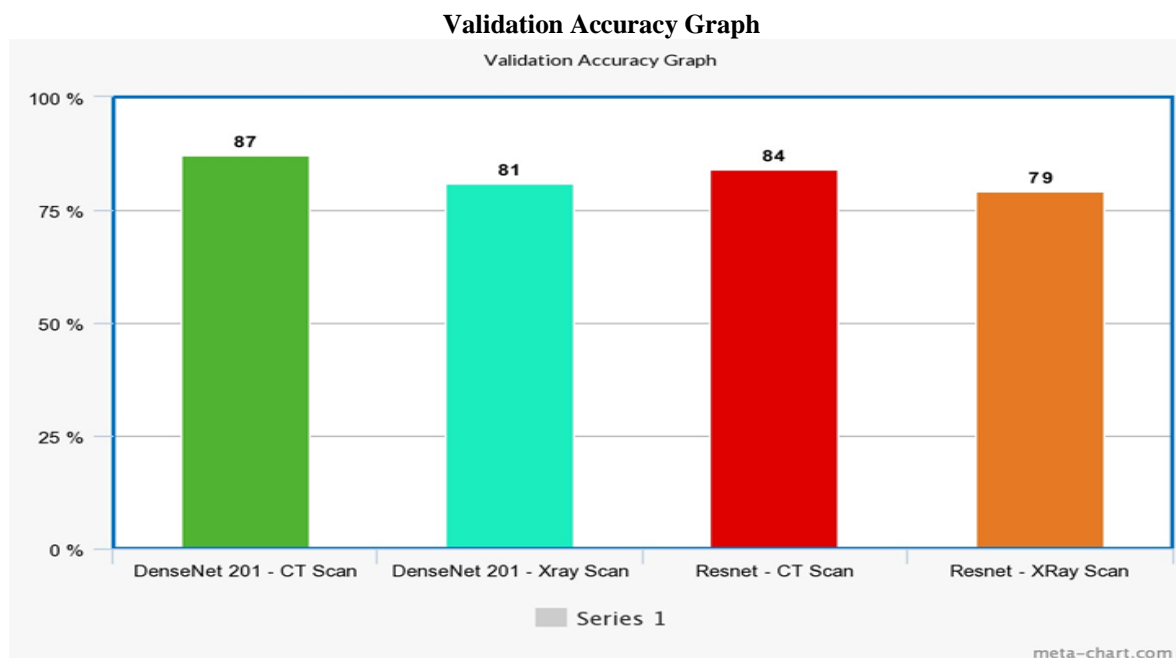
IV.   DENSE NET ARCHITECTURE

Denseness *requires fewer parameters* than an equivalent traditional CNN, as there is *no need to learn redundant feature maps*. Furthermore, some variations of ResNets have proven that many layers are barely contributing and can be dropped. The number of parameters of ResNets is big because every layer has its weights to learn. Instead, *DenseNets layers are very narrow* and they just *add a small set of new feature maps*.

(a) A CNN block   **(b)** A ResNet Block

(c) DenseNet block (layer number = 5, growth rate = k)
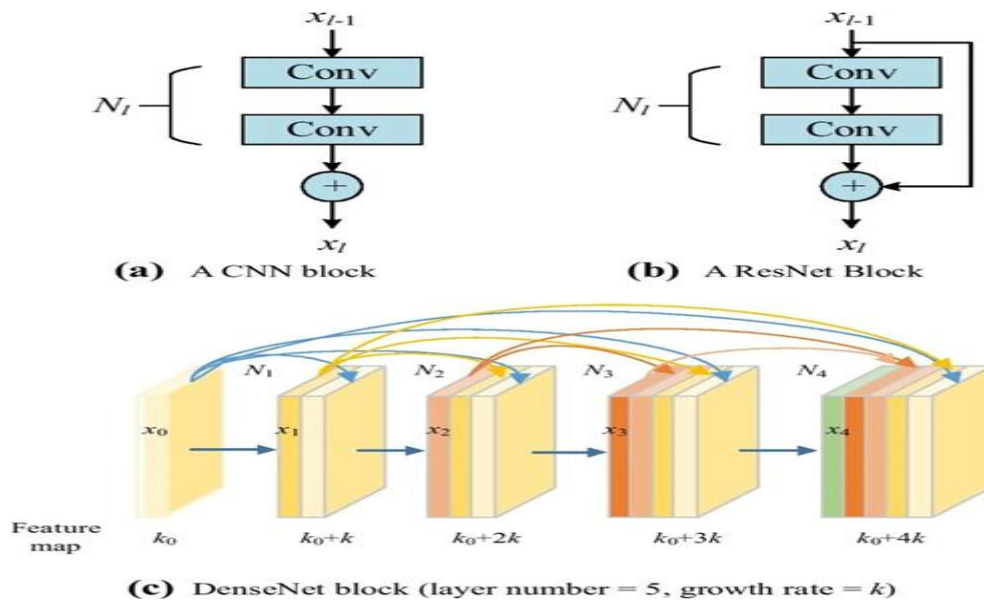
Training Accuracy Graph

Validation Accuracy Graph

V. CONCLUSION

We would like to conclude that we have built a machine learning model which can detect if some person is COVID positive or not. By using our model one can simply login into the website, upload their CT_SCAN or X_RAY images and check the results in a matter of seconds and can test if they have COVID or not. Henceforth, the project helps detect pneumonia caused due to Covid-19 & helps identify safety zones in the neighborhood

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