

# Prediction of covid-19 & pneumonia by using convolutional neural network and deployment by using the web framework

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**Abstract—** The symptoms of covid-19 and Pneumonia are similar. Steps must be taken to distinguish between covid-19 and other types of pneumonia patients. In this paper a model of Convolutional Neural network(CNN) is presented by using Tensorflow, keras, numpy and Matplotlib to detect covid-19, Pneumonia, both covid-19 & Pneumonia and normal Patients. It is based on classification which is a supervised learning. There are four classes, they are normal, covid-19, Pneumonia, both covid-19 & Pneumonia. The paper is deployed by using by using the django framework in pycharm. It is a example of chest x-ray image classification by using tensor flow, Matplotlib, keras and numpy library and alexnet.

**Key words:** *Convolutional Neural Network (CNN), classification, alexnet*

## I. INTRODUCTION

The technology of chest X-ray Image classification has helped in the detection of covid-19, Pneumonia, both covid-19 and Pneumonia & normal patients. The algorithm that has achieved result is the convolutional neural network. The paper is deployed the created model in Django framework and created a excellent user interface for uploading the chest X-ray image and to get the output result. The paper specifies all the different types of eight layers used for the implementation of the paper and all the steps that must be followed for the successful classification of the input chest x-ray image as normal, covid-19, pneumonia, both covid-19 & pneumonia.

## II. OBJECTIVE

The objective of the paper is to automate the prediction of covid-19, pneumonia, both covid-19 and pneumonia & normal patients by using chest x-ray images with highest accuracy, to improve the efficiency of the prediction and also to save time & to decrease the workload on medical staffs

## III. EXISTING SYSTEM

The Existing System focuses on using CT Scan images to detect normal, Covid-19, Pneumonia, both Covid-19 & Pneumonia Patients. Convolutional Neural network has the potential of automating the task of detection. The existing System has not used AlexNet CNN along with the libraries like Keras and Tensor flow as Classifier. It has also not used OpenCV library. The recognition rate & accuracy of classification of the chest X-ray images is very less

## IV. PROBLEM STATEMENT

The chest X-ray images of Covid-19, Pneumonia, both covid-19 & pneumonia affected patients are similar and resulted in the confusion which promotes the delay in the treatment of covid-19, pneumonia & both covid-19 and pneumonia affected patients. The absence of less costly method for detection of covid-19, pneumonia, both covid-19 & Pneumonia patients has resulted in the use of costlier methods which all people of the world cannot afford

## V. PROPOSED SYSTEM

The proposed System proposes Convolutional Neural network for classifying the chest x-ray images. It proposes to train the model with covid-19, pneumonia, normal, and both covid-19 & Pneumonia chest x-ray images. It uses the process of data pre-processing and then the images are visualized and the chest x-ray images are classified as covid-19, Pneumonia, both covid-19 & Pneumonia and normal images. The used Algorithm in the project is AlexNet.

### Advantages of proposed system

Large amount of chest X-ray data for covid-19, Pneumonia, both covid-19 & pneumonia and normal is used to train the model by using CNN. It is one of the best system by using CNN to classify and detect covid-19, Pneumonia, both covid-19 & pneumonia among the patients. It is less costly and saves time. It is a scalable method of classification and detection of covid-19, Pneumonia, both covid-19 & pneumonia and normal.

## VI. REQUIREMENTS

The Requirements are of two types. They are hardware requirements and software requirements.

### Hardware Requirements:

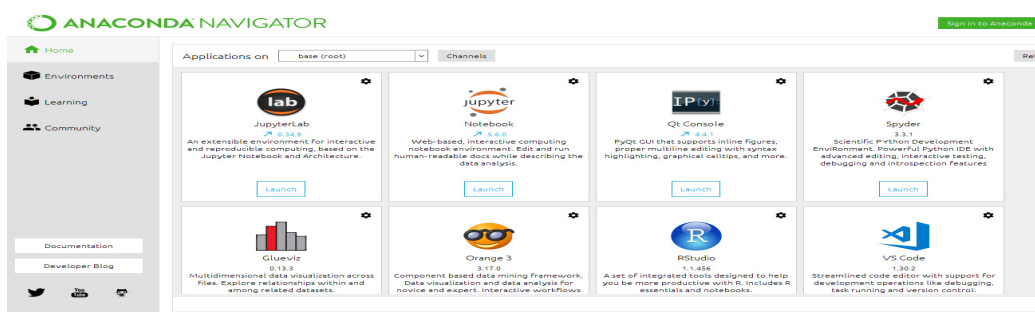
Processor: Intel core

RAM: 4GB

Hard disk Capacity: 500GB

### Software Requirements:

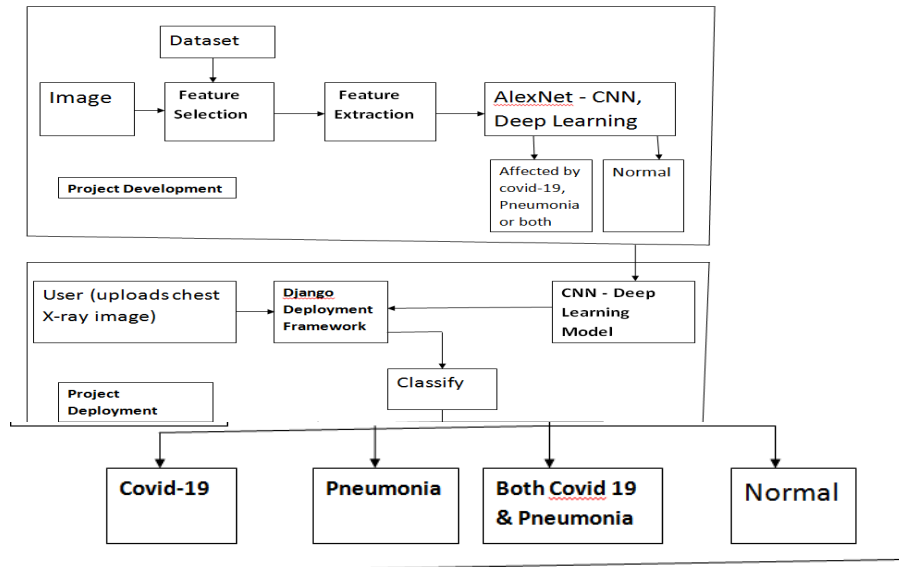
#### 1. Anaconda Navigator



### 3. Pycharm

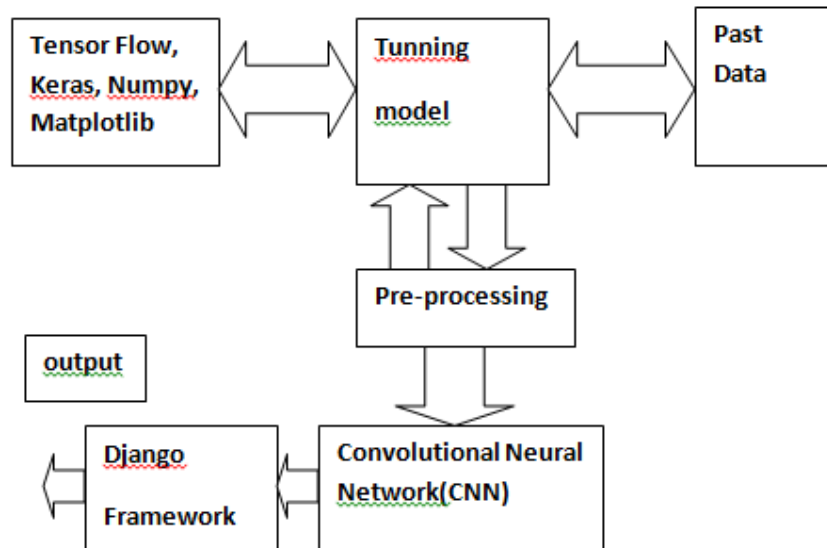


## VII. SYSTEM ARCHITECTURE



The paper is based on classification which is supervised learning. The X-ray images are classified into four classes. The four classes are covid-19, pneumonia, both covid-19 and Pneumonia & normal. The X-ray Images of the dataset passes through the process of feature selection and feature extraction. Some Image features of covid-19, pneumonia are lines, points, edges, corners and others. During feature extraction all image textures of covid-19, Pneumonia & normal X-ray images are extracted. After extraction, AlexNet which is one among the Convolutional Neural Network is applied. The model is deployed in the web framework by using Django. The user uploads the X-rays and the X-rays are classified as Normal, Covid-19 & Pneumonia. This means the model detects whether the patients are suffering from covid-19 or pneumonia

#### VIII. FLOW DIAGRAM



The flow diagram describes the interrelated things of interest in a specific model. The diagram shows the Flow model which is composed of libraries and past data and specifies the relationship that exists between them. The tensor flow model is used with the past data which include the test and train data. The tuning model maximizes the model performance without over fitting the model. The tuning model is applied the process of preprocessing and the deep learning algorithm is applied. During Pre-processing the process of data cleaning, data integration is applied. The algorithm used in this project is AlexNet. The model is finally deployed by using the django framework. The user gets the output after uploading the X-ray images. The images are classified as covid-19, Pneumonia, both covid-19 and Pneumonia & normal. [2] discussed that The study of viruses and their genetics has been an opportunity as well as a challenge for the scientific community. The recent ongoing SARS-Cov2 (Severe Acute Respiratory Syndrome) pandemic proved the unpreparedness for these situations. Not only the countermeasures for the effect caused by virus need to be tackled but the mutation taking place in the very genome of the virus is needed to be kept in check frequently.

#### IX. IMPLEMENTATION

##### Modules of the paper

1. Covid-19 & Pneumonia detection model 1
2. To build a model for Lenet Convolutional Neural network
3. To build a model for AlexNet Convolutional Neural network

##### Different Types of Layers used in implementation

1. Input Layer
2. Convolutional Layer
3. Pooling layer
4. Fully connected Layer

##### Steps of implementation of the paper

The steps involved in implementing paper are the steps of classification of the different X-ray images as normal, covid-19, Pneumonia, both covid-19 & pneumonia. These steps are also called the steps involved in the Implementation of the concept of detection of normal, covid-19 & Pneumonia patients. These steps are also the steps by which the convolutional Neural Network, AlexNet classifies the X-ray images as normal, covid-19, normal, both covid-19 & pneumonia

##### Step 1: Import the Required Libraries

- The required Libraries are imported
- The required libraries are:

- Keras
- Tensorflow
- Numpy
- Matplotlib

#### **Step2: Import the dataset**

In this step the dataset is imported.

Import the data set by using keras preprocessing image data generator function and also create size, rescale, range, zoom range, horizontal flip. Then import the image dataset from folder through the data generator function. Set the train, test, and validation and also set target size, batch size and class-mode from this function. Train the model using the created network by adding layers of CNN.

#### **Step3: Process the data**

Process the test and train data

```
x_train = x_train.reshape(x_train.shape[0],1,img_rows,img_cols)
x_test = x_test.reshape(x_test.shape[0],1,img_rows,img_cols)
Input_shape = (1, img_rows, img_cols)
```

#### **Step4: Create the model and add the layers**

Create the actual model and add the layers

```
Model.add(conv2D(32, Kernel_size = (3,3),activation='relu'))
Model.add(conv2D(64, (3,3),activation='relu'))
Model.add(MaxPooling2D(pool_size=(3,3)))
```

#### **Step5: Compile the model**

Compile the model by using selected loss function, optimizer and metrics

```
Model.compile(loss = keras.losses.categorical_crossentropy, optimizer = tensorflow.keras.optimizers.A1ta(), metrics = [ 'accuracy'])
```

#### **Step6: Train the model**

The model is trained by using the trained data of normal, covid-19 & Pneumonia

#### **Step7: Evaluate the model**

The model is evaluated by using the test data of normal, covid-19 & Pneumonia

#### **Step8: Predict the X-ray images of the patients as normal, covid-19 & Pneumonia**

In this step the X-ray images of patient is predicted as covid-19, Pneumonia, both covid-19 & Pneumonia and normal

#### **Model of Lenet & AlexNet Convolutional Neural Network:**

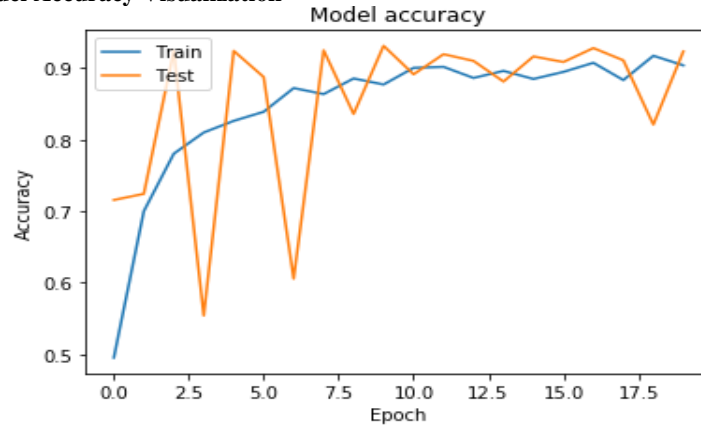
In these module the model is trained by using classifier and fit generator function and training steps per epoch is made. The module is tested by giving an input.

#### **Deploying the model in Django Framework:**

The Convolutional neural network model gets converted into hierarchical data format file(.h5 file). The project is deployed by using the django framework for providing the best user interface and predicts the chest X-ray image as normal, covid-19, Pneumonia, both covid-19 and Pneumonia

## X. GRAPHS AND INPUT DATA

### Model Accuracy Visualization



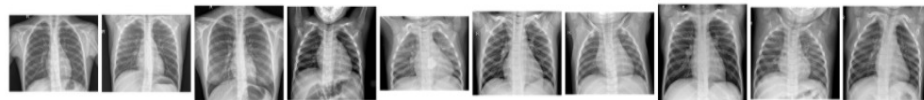
The model Visualization consists of test and train data. The accuracy of train data is represented by blue line. The accuracy of test data is represented by orange line. The drop of test accuracy happened initially when test x-ray images of patients suffering from both covid-19 and pneumonia was used. The accuracy of detection of covid-19, pneumonia, both covid-19& Pneumonia and normal chest x-ray images is 95%

#### Trained Data For Normal:

1. The number of images is 471
2. The minimum width is 993
3. The maximum width is 2534

Trained data for dir\_name\_train\_NORMAL:

```
===== Images in: Data/train/NORMAL
images_count: 471
min_width: 993
max_width: 2534
min_height: 617
max_height: 2534
```

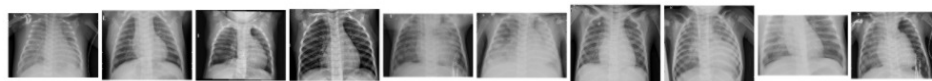


#### Trained Data For Pneumonia:

1. The number of Images is 517
2. The minimum width is 502

Trained data for PNEUMONIA:

```
===== Images in: Data/train/PNEUMONIA
images_count: 517
min_width: 502
max_width: 1944
min_height: 307
max_height: 1944
```

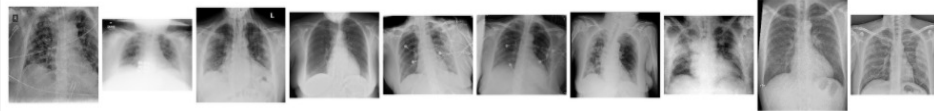


#### Trained Data For Covid-19:

1. The number of images is 460
2. The minimum width is 224
3. The maximum width is 4757
4. The minimum height is 224
5. The maximum height is 4757

Trained data for COVID19 type disease:

```
===== Images in: Data/train/COVID19
images_count: 460
min_width: 224
max_width: 4757
min_height: 224
max_height: 4757
```



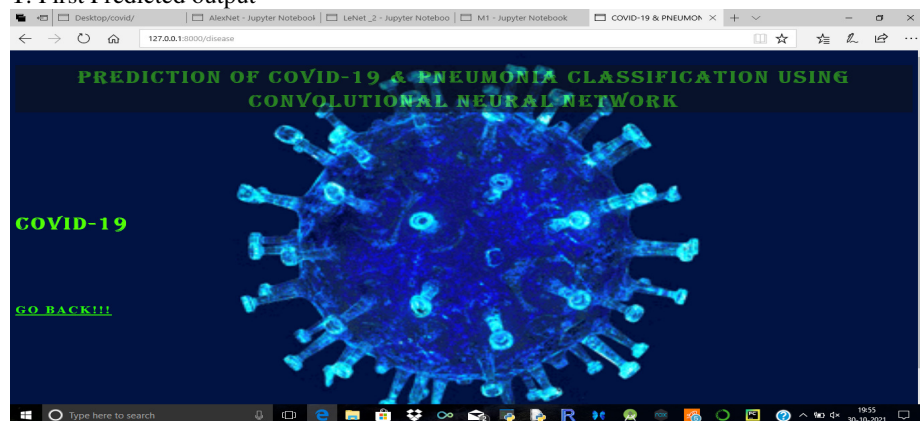
### Django Deployment:

The Deployment of the paper is done in web framework by using Django. Click on the browse button and the dialog box appears. Choose a chest X-ray image for uploading. Click on the upload button for uploading the image and finally click on the Result button to view the result.



## XI. RESULTS AND OUTPUT

### 1. First Predicted output

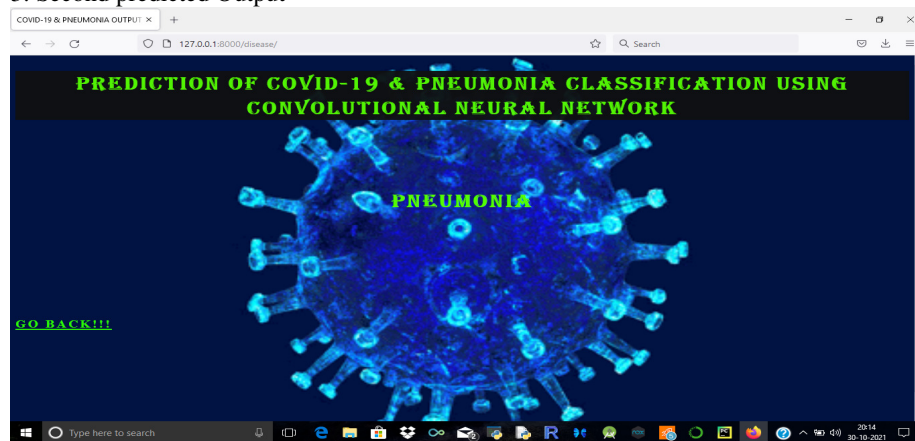


### 2. Uploaded the Second Image

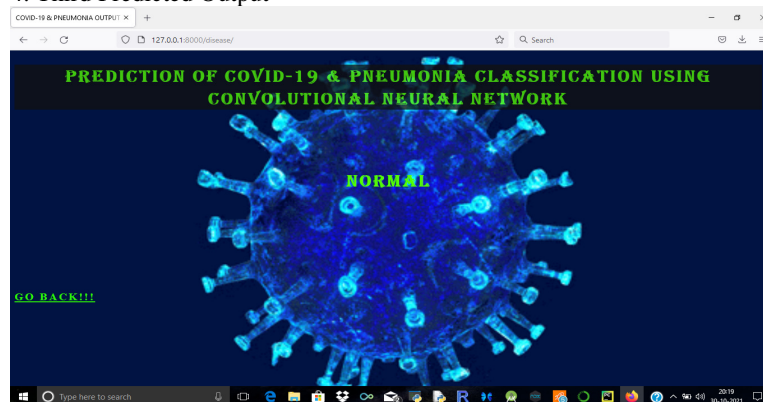


[Result](#) [Go Back!!!](#)

### 3. Second predicted Output



### 4. Third Predicted Output



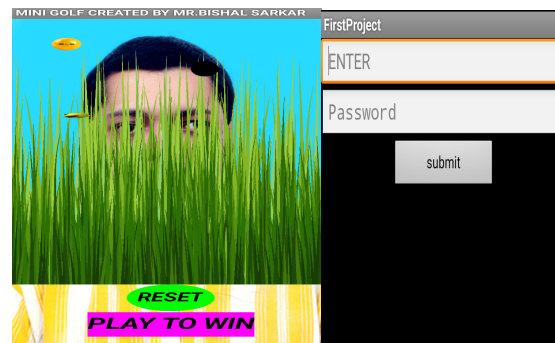
## XII. FUTURE IMPLEMENTATION

- To deploy the Paper in Web, desktop, iOS and Android Application.

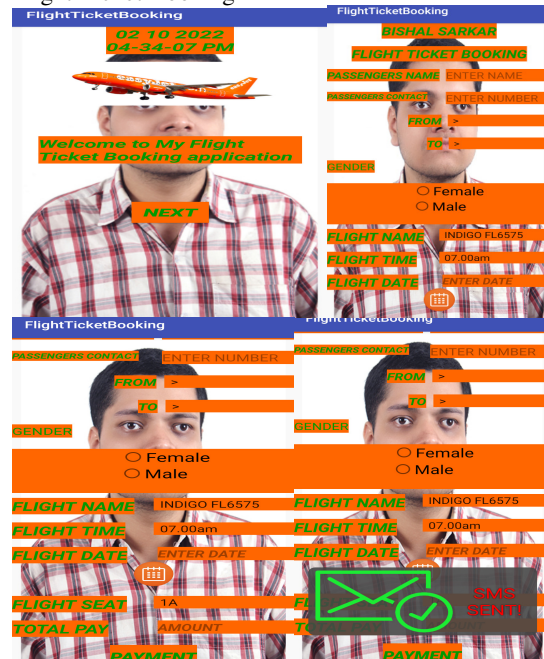
- To deploy the Deep learning Model to Medical Departments in Various Countries.

### XIII. MOTIVATION BEHIND THE FUTURE IMPLEMENTATION

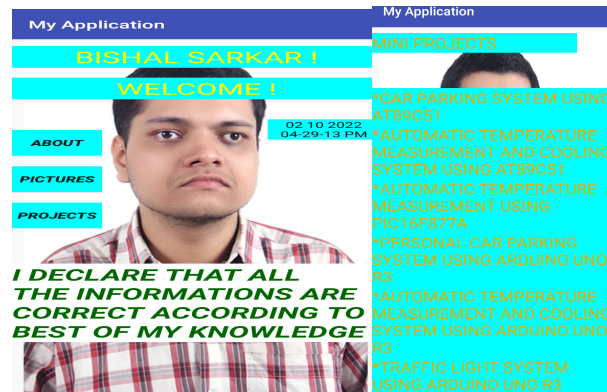
- I created many Android Application by using Android Studio.
- They helped me to enhance my Real time practical coding skills
- Some of them are:
- Flight Ticket Booking
- My Application
- Mini Golf
- Register and Login
- And many more



Flight Ticket Booking



My Application Android Application



- The Android Applications created by me has provided me the Hands-on Experience of creating many other excellent projects.
- My Hands-on Experience has motivated me for the future enhancement of this project named, Prediction of covid-19 and pneumonia by using convolutional neural network and deployment by using the web framework

#### XIV. CONCLUSION

The Implementation of this paper detects whether a person is suffering from covid-19, Pneumonia, both covid-19 & Pneumonia. This project improves the Model of detection of normal, covid-19, Pneumonia and both covid-19 & Pneumonia. The project detects the Chest X-Ray images of the Real Time Patients and also reduces the workload of medical staffs and also saves lots of time.

#### REFERENCES

- [1] Gengfei Ling, Congcong Cao, "Automatic Detection and Diagnosis of Severe Viral Pneumonia CT Images Based on LDASVM," *AI models with Applications*, vol. 94, pp. 01-01, 2022.
- [2] Christo Ananth, Pranav Pushkar, Preeti Nagrah, Jehad F. Al-Amri, Vividha, Anand Nayyar, "Mutation Prediction for Coronaviruses using Genome Sequence and Recurrent Neural Networks", *Computers, Materials & Continua, Tech Science Press*, Volume 73, Issue 1, April 2022, pp. 1601-1619
- [3] Masahiro Hayashitani, Eiji Yumoto, Toshinori Hosoi, Masahiro Kubo, "Field Trial of Aspiration Pneumonia Prediction based on Electronic Medical Records," *IEEE transactions on medical imaging*, vol.33, pp. 1803-1817, 2020



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Bishal sarkar pursued his Masters on Artificial Intelligence at Hindustan Institute of Technology and Science in Chennai. He is having lots of experiences. He worked as data analyst at Robokart, West-Borivali, Mumbai, Android Application developer at Spiro solutions, T. Nagar and Deep Learning, Machine Learning, Computer Vision & blockchain project developer at Pantech e learning..