

DIAGNOSIS OF CORONAVIRUS USING CHEST X-RAY

Covid-19 Detection Using Chest X-Ray

¹ Avadhut S. Sonavane, ² Mansi D. Patil, ³ Siddhika V. Patil, ⁴ Prof. Deveshree Wankhede

¹ Student, ² Student, ³ Student, ⁴ Assistant Professor,

^{1,2,3,4} Department Of Computer Engineering,

^{1,2,3,4} Shivajirao S. Jondhale College of Engineering, Dombivili, Maharashtra.

Abstract: Life is a very important topic. It tries to get effective and stable detection as soon as possible so that the patient receives proper care. It is very important in the medical field to diagnose a particular disease. Most of the techniques have been used, going beyond traditional methods. Many emerging strategies make it necessary to provide a complete overview that avoids certain aspects of finding and acquiring discovery

We are developing a Machine Learning project for use in Covid diagnostics. This review focuses on modern techniques related to the development of learning machines used to diagnose human diseases in the medical field, to find interesting patterns, to make meaningless predictions, and to be useful in decision-making.

In this case, we used more than 20000 X-Ray images to train the model to get better predictable results. We have pictures of Corona positive, Normal, Lungs Infection, and viral Pneumonia. Using the Best Deep Learning model we trained our model and created a predictive model. We've also made a UI for the user to use easily. We have also added a Covid-19 self-assessment form for the patient.

Keywords – Machine Learning , Deep Learning , User Interface (UI) , Covid -19, Model, X-Ray.

I. INTRODUCTION

Health is a very important topic for society. It tries to get effective and stable detection as soon as possible so that the patient receives proper care. It is very important in the medical field to diagnose a particular disease. Most of the techniques have been used, going beyond traditional methods. Many emerging strategies make it necessary to provide a complete overview that avoids certain aspects of finding and acquiring discovery[1]

We are developing a Machine Learning project for use in Covid diagnostics. This review focuses on modern techniques related to the development of learning machines used to diagnose human diseases in the medical field, to find interesting patterns, to make meaningless predictions, and to be useful in decision-making.[2]

In this case, we used more than 20000 X-Ray images to train the model to get better predictable results. We have pictures of Corona positive, Normal, Lungs Infection, and viral Pneumonia. Using the Best Deep Learning model we trained our model and created a predictive model. We've also made a UI for the user to use easily. We have also added a Covid-19 self-assessment form for the patient.[3]

II. LITERATURE SURVEYS

1.An Image Analysis System for Dermatology :

In this paper, we propose a picture analysis program to detect skin diseases. Our system is able to take pictures from general information and integrate them into the system to alert the user to prevent threats linked to skin diseases. In short, we are introducing a photo analysis program to diagnose various skin diseases, in which users will be able to take pictures of different moles or skin spots. Our system will locate and process the image and classify the image into a general one, melanoma, psoriasis, or dermatology extracted from cases that produce image features. A notification will be given to the user to get clinical help if the mole is from the normal stage of melanoma. [4]

2.Skin disease Screening system using image processing and data mining :

The proposed program will take pictures with a smartphone camera. Pre-adjustment and splitting will be done on each image. Then the removal of the feature is done on the skin lesions The removal factor is very important in the use of Predictive modeling. Feature releasing in Image Processing is a way to capture visual content of targeted and retrieved images. Original image elements can be standard features, such as color rendering, texture, and layout, or Domain-specific features. After the feature is removed, feature separation can be done. In Feature Release, the system will compare the captured image with the training

database using image processing techniques and determine whether the skin is diseased or not using a decision-making tree. If there is a disease, then the app will provide medical advice for the Android system. [5]

3.Skin Disease Recognition Method Based on Image Color and Texture Features :

Skin diseases have a profound effect on the health and well-being of people. Current research suggests an effective way to identify unique types of skin diseases For many skin diseases it is necessary to develop automated methods to increase the accuracy of diagnosis. classification of lesion using classification algorithm is used.The gray-level co-event matrix (GLCM) standard was then introduced for photographic imagery. One of the advantage is that it automates (approaches) to overcome in automation for a mentioned challenges in automating medical image diagnosis [6]

4. Automatic System for prediction of skin disease:

This research paper presents the development of an automated dermatological diagnostic program that captures skin lesions as user input and predicts skin type. The program uses a two-stage approach to the acquisition and prediction process that successfully combines image processing and machine learning. In the first stage, After the feature is removed the image of the skin condition is subjected to various pre-processing techniques, The output elements of each image are then converted to the vector of the element. The system uses a dual stage approach for detection and prediction process which effectively amalgamates image processing and machine learning. They have also given the detail description of feature Extraction and Image processing unit. [7]

5.Using Artificial Neural Network and Image processing Diagnosis of Skin Disease Detection :

Yasir. R et al. The aim is to build a system that can detect dermatitis while providing a picture of a skin lesion. Their study used image processing techniques to extract color elements. In addition, the study examined user input or symptoms such as color and type release, stool quality, sensitivity, duration, height, and other demographic information such as age and gender. whether in this wound or not. The sponsors of this study were able to achieve 80-90% accuracy in diagnosing nine different skin diseases [8]

III. PROBLEM DEFINATION

The computer can also interpret and process many images where it is difficult for anyone to interpret such a high amount of information and look at the details of the image inside. The most common technology used to predict performance skills using In-depth Learning and Learning Machines.

In this case, we used the Convolution Neural Network Model to provide more than 21000 X-ray images, and finally, we will find four neurons by Corona positive, Normal, Lungs Infection & Viral Pneumonia images uploaded to the database. This we will use the Keras API and we will use this Neural Network Architecture. Add additional layers for various models such as VGG16, VGG19, ResNet50, DenseNet, InceptionV3 using Transfer Learning.

Earlier we used Python Flask Language and the real backend is TensorFlow here's how we will use the same convolution layer. Our proposed program will successfully predict Corona positive, Normal, Lung Infection, Viral Pneumonia with the help of machine learning and Artificial intelligence. and by guessing the best algorithm. The system will gain more than 85 - 90 percent efficiency in classifying XRay images.

IV. EXISTING SYSTEM

The existing systems will make a model which can detect Corona Virus, Viral Pneumonia, Lungs Infection, and Normal X-Ray images The model is very robust we trained the model with more than 20000 images to get the best prediction. We Created the web app in which the user will select the image which we want to check. Then we will click on predict button then the model will show the prediction. The X-ray which is checked for prediction then it will get saved in the folder.

V. PROPOSED SYSTEMS.

The computer can also interpret and process many images where it is difficult for anyone to interpret such a high amount of information and look at the details of the image inside. The most common technology used to predict is Artificial Intelligence using Learning Machines and DeepLearning.



Figure 5.1: Project implementation

For this we used the Convolution Neural Network Model to provide input of more than 21000 X-Ray images and finally, we will get four neurons images of Corona positive, Normal, Lungs Infection & Viral Pneumonia are uploaded to the database. This is Figure 5.1: Project implementation we will use the Keras API and we will use this Neural Network Architecture. Add additional layers for various models such as VGG16, VGG19, ResNet50, DenseNet, InceptionV3 using Transfer Learning. Previously we used Python Flask Language and the real backend is Tensor-Flow this is how we will use the convolution layer

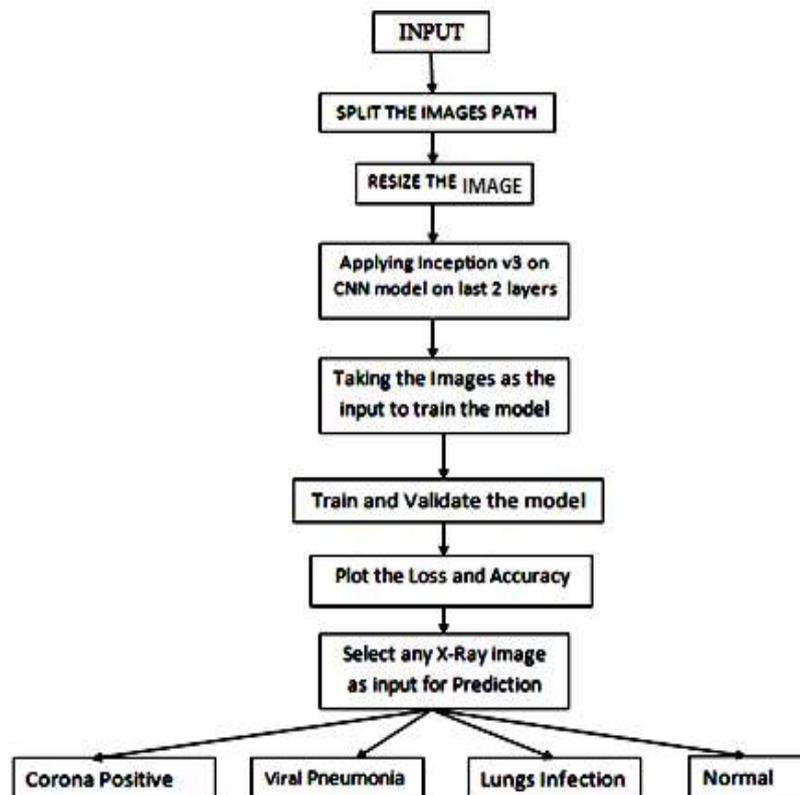


Fig 5.2: Proposed System

Our proposed program will successfully predict Corona positive, Normal, Lung Infection, Viral Pneumonia with the help of machine learning and Artificial intelligence. and by guessing the best algorithm. The system will gain more than 85 - 90 percent efficiency in classifying XRay images.

In the above figure, it is shown that the origin of the data is collected from various sources and then the data is processed using the dataset and that the data set is used to train and test the MI and DL algorithms model and to use the CNN model if low accuracy is shown. by increasing the value of Epoch we can increase accuracy.

VI. MODELS

In this model, we used CNN Model using Transfer Learning Model using VGG 16 Model, VGG19, Resnet50, DenseNet, Inception V3 and many more to get the most accurate prediction VGG16 is widely used worldwide and also much higher accuracy than -VGG19 in prediction. We will use the Inception V3 model much faster compared to VGG16.

VGG16:

To outperform ILSVR (Imagenet) competition the VGG16 is an evolutionary neural net (CNN) architecture that was used in 2014. It is considered to be one of the most visible model structures to date. The most unique thing about VGG16 is that instead of having large hyper-parameter values they focus on the 3x3 filter convolution layer with 1 stride and always use the same 2x2 layer 2 layer filter. These meeting arrangements and layers of large lakes are constantly in the field of art. Finally, it consists of fully composite layers, followed by Soft-max extraction. VGG16 means its weight is 16 layers. This network is very large and has approximately 138 million parameters (approximately).

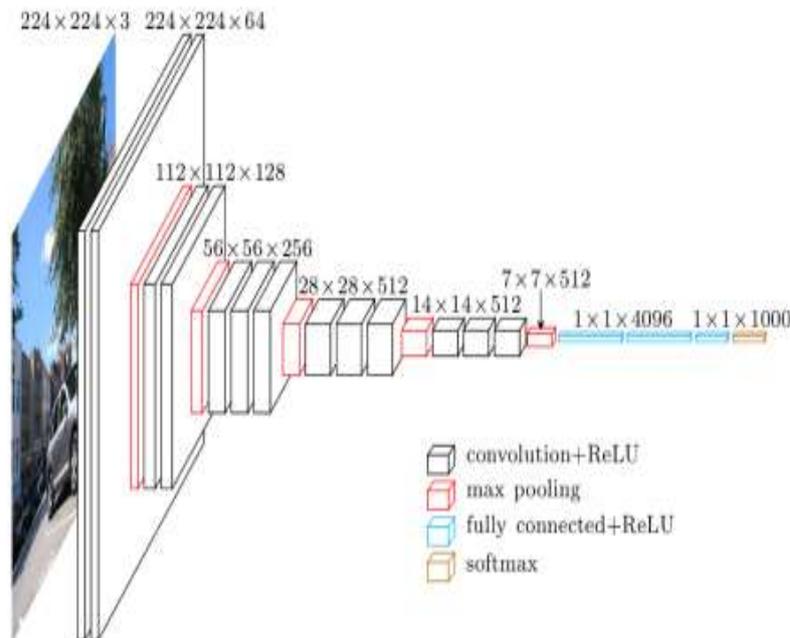


Fig 6.1:VGG16 Architecture

Inception-v3:

Many improvements have been made to the Inception-V3 Conventional Neural Network architecture from the early family, including label smoothing, FactTrade 7X7 convolution, and the use of help separator (and batch customization) to spread label information across the network. Side layers).

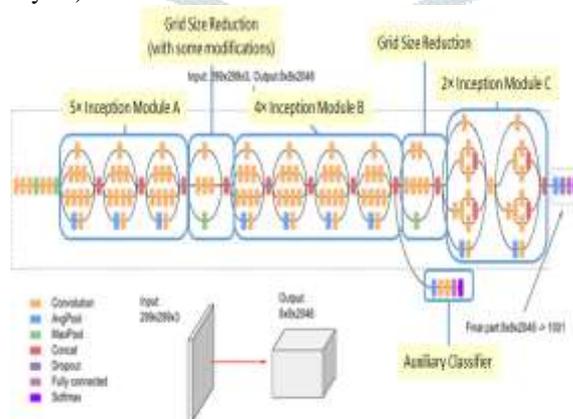


Fig 6.2: Inception V3

We perform the following tasks:

- Complete by subtracting our basic model to 1 size
- Install a fully integrated layer with 1,024 hidden units and ReLU functionality
- During this time, we will go to a drop-out rate of 0.2
- Install Sigmoid fully integrated storage layer
- We will also use RMSProp, although you can also try Adam Optimiser

We note that we obtain 96% verification accuracy in 10 epochs. And note, how much faster this model is than VGG16. Each time takes about 1/4 of the time when each time in VGG16. Of course, you can always try different hyper-parameter values and see how much better / worse it works.

I enjoyed studying the original model. While many models at the time were merely sequential and followed the basis that the model is deeper and larger, it is better to do- The beginning and its diversity broke this mold. Like its predecessors, Inceptionv3 earned the highest ranking in CVPR 2016 with an error rate of 3.5% over only 5.

VII. ADVANTAGES

1. It will be very helpful for Doctors to check and get accuracy.
2. It was easy to automate data analysis and make the health care system more robust. By using DL's ability to manage high-volume data
3. It also helps doctors to differentiate between different types of diseases in order to diagnose and diagnose accurate diseases.
4. Improves system performance that can predict you within seconds.
5. Currently, we have introduced 4 types of diseases in our project that we will receive, our model can predict Corona Positive, Lung infections, Viral Pneumonia, and Normal X-Ray.

VIII. RESULTS

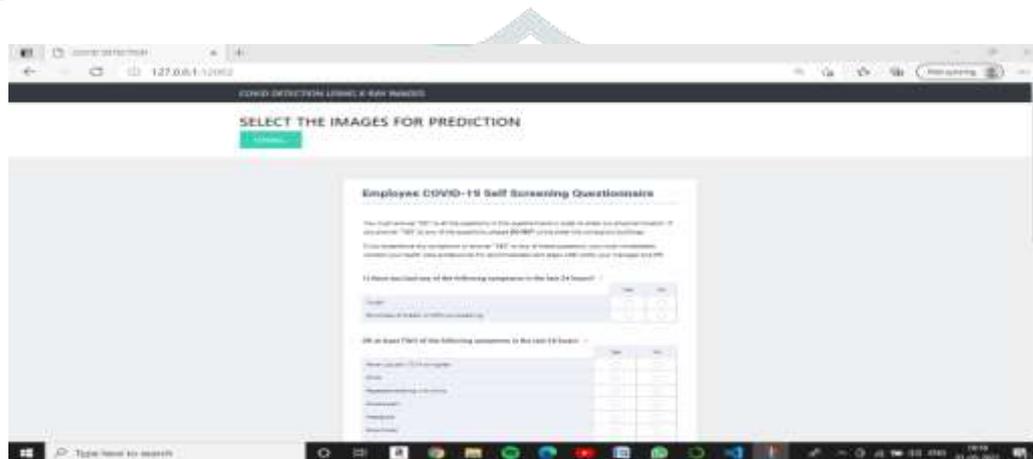


Fig 8.1: Select the Images to predict

In this Figure 8.1 click on the Choose Button to select the images from the destination location

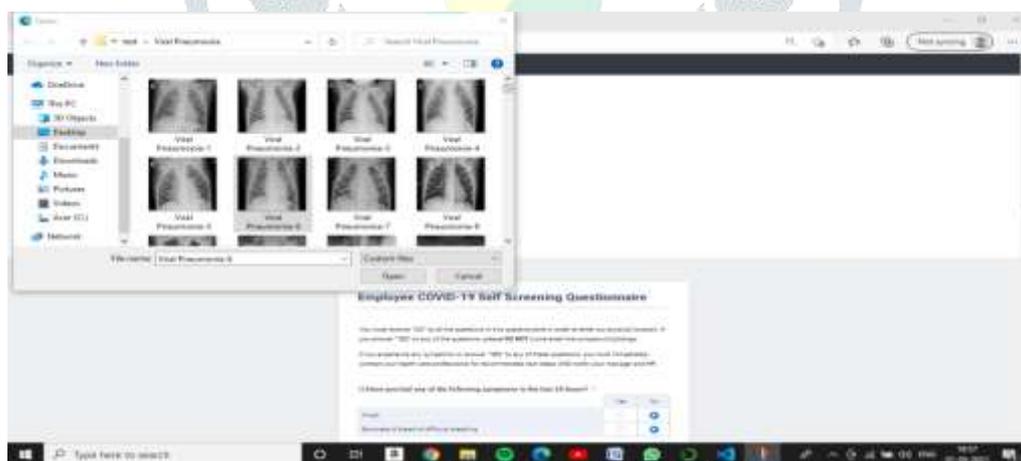


Fig 8.2: Select the Images from the location

In this Figure 8.2, we have to select the X-Ray Image from the destination folder for prediction.

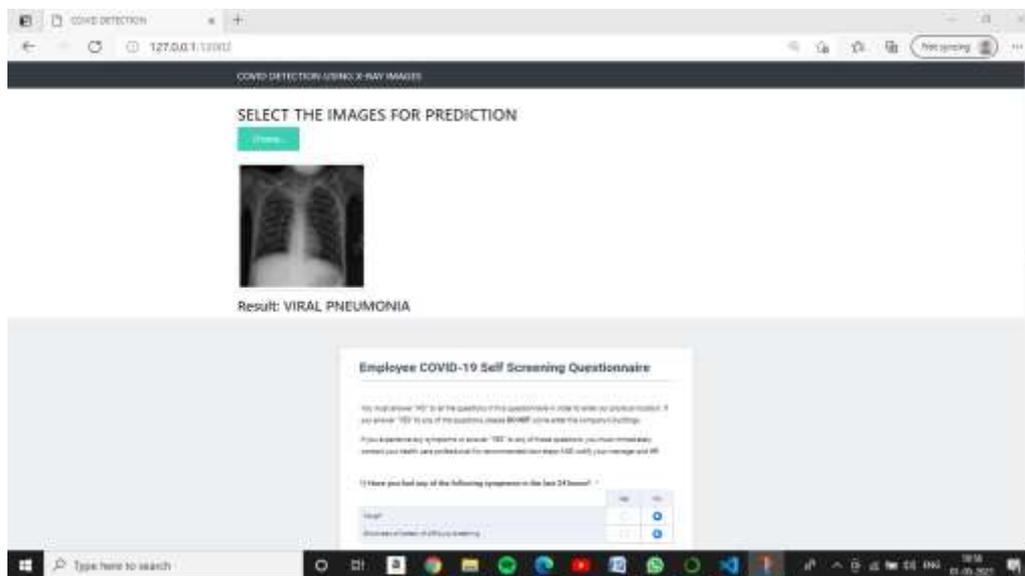


Fig 8.3: Image Selected and prediction is Viral Pneumonia

In this Figure 8.3 Image is selected and clicked on the predict Button then the prediction Result is Viral Pneumonia

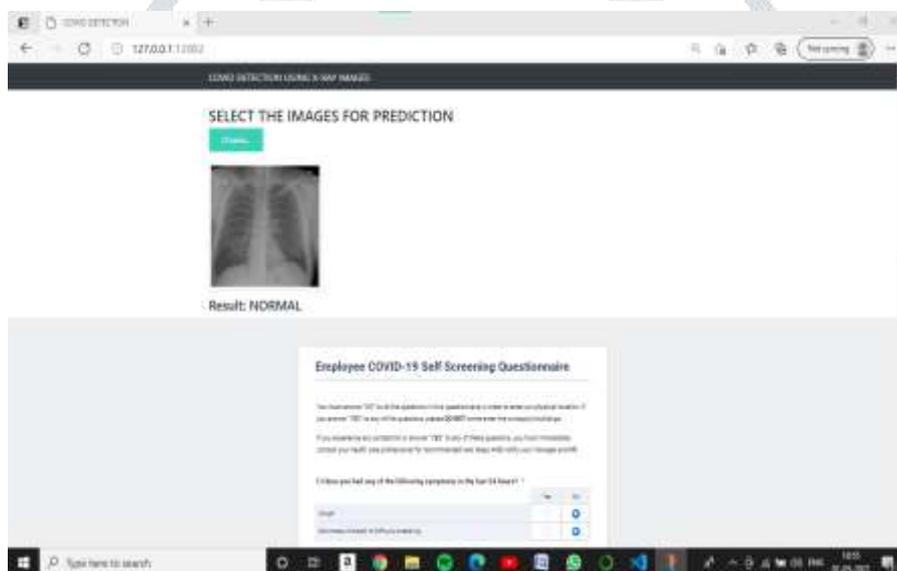


Fig 8.4: Image Selected and prediction is Normal

In this Figure 8.4, we have selected the X-ray image and when we click on the predict button the result is shown Normal.

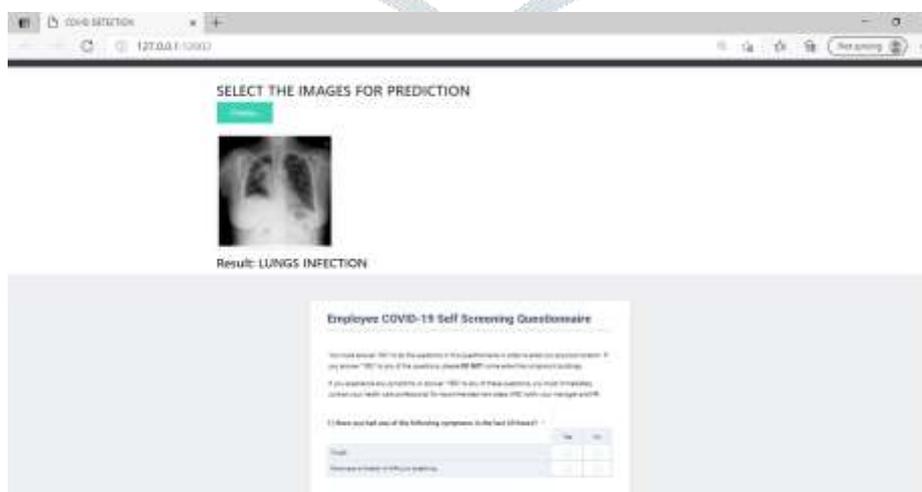


Fig 8.5: Image Selected and prediction is Lungs Infection

In this Figure 8.5, we have selected the X-ray image and when we click on the predict button the result is shown Lungs Infection.

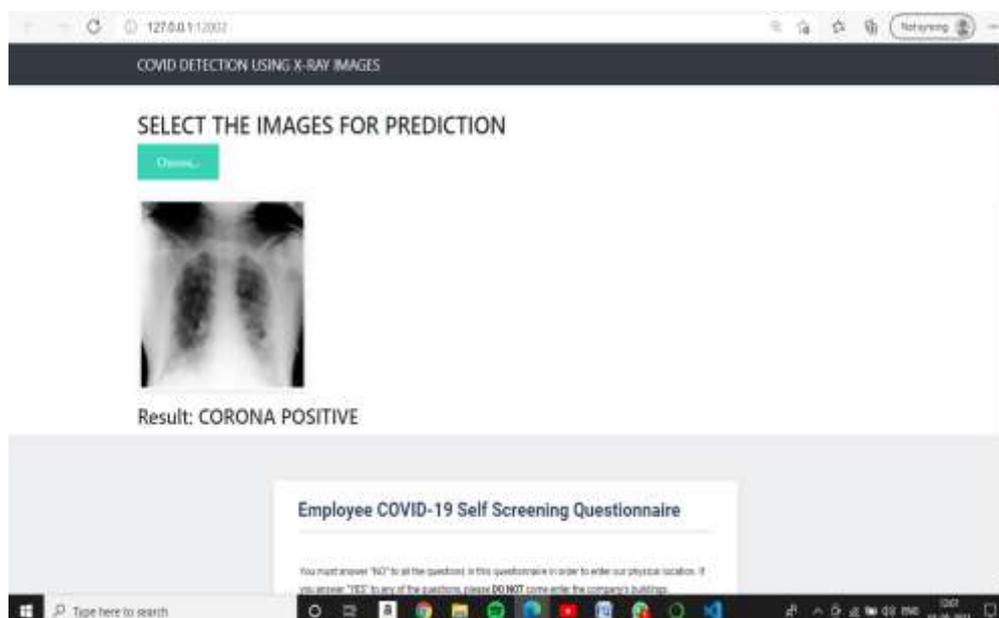


Fig 8.6: Image Selected and prediction is Corona Positive

In this Figure 8.6, we have selected the X-ray image and when we click on the predict button the result is shown Corona Positive.

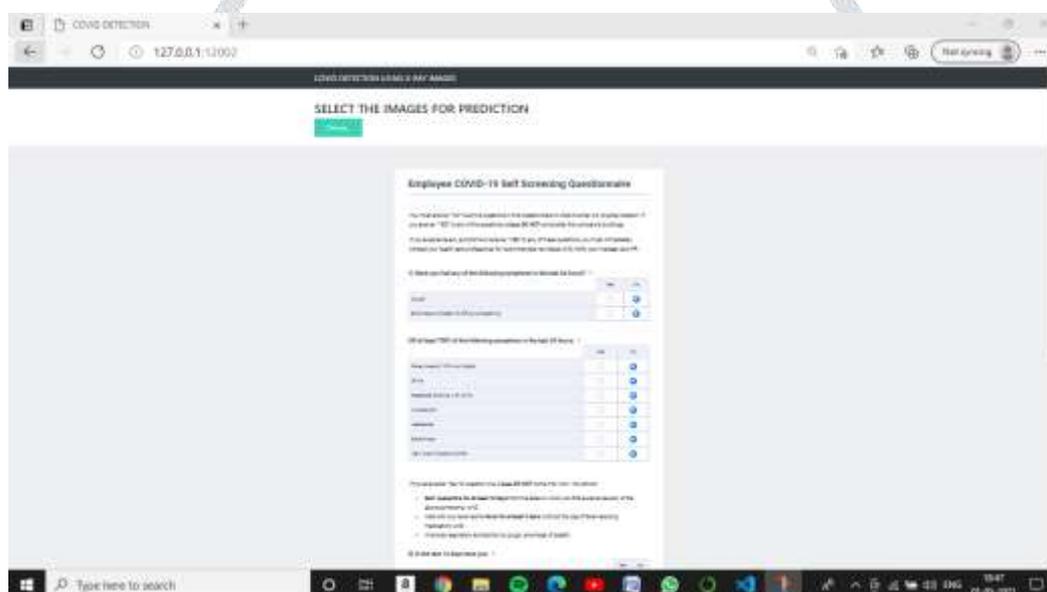


Fig 8.7: Self Screening Questionnaire Form

In this figure 8.7, we have created a form for self Screening Questionnaire for the patients.

IX. FUTURE MODIFICATION

In the future, we will use a more accurate database and use a very different machine learning algorithm and check the accuracy of the data and apply that algorithm to the system. We are building a new database for the various diseases you can predict.

X. CONCLUSIONS

In this study, We proposed an in-depth study model based on the detection and classifications of Corona cases from X-ray images. Without the need for a manual feature removal, our model is completely automated with the highly end-to-end structure. Our advanced system can perform binary and multi-stage operations with an accuracy of 98.08% and 87.02%, respectively. To come over the shortage of radiologist this system can be used in many areas in countries affected by Coronavirus. Also, To diagnose other asthma-related diseases such models can be used. Due to the limited number of COVID-19 X-ray images, still we have collected images and used 21000 X-Ray images of Covid Positive, Normal, Lungs Infection, Viral Pneumonia for model training. In this case, we have created a project UI that contains the Self Questionnaire form. After facing many challenges we have successfully implemented the project and learned many things that have helped us to learn new technologies and patterns.

REFERENCES

- [1] Caliendo, A. M., Gilbert, D. N., Ginocchio, C. C., Hanson, K. E., May, L. Quinn, T. C. (2013). Better Tests, Better Care: Improved Diagnostics for Infectious Diseases. *Clinical Infectious Diseases*, 57(suppl 3), S139–S170. doi:10.1093/cid/cit578
- [2] Jiang, F., Jiang, Y., Zhi, H., Dong, Y., Li, H., Ma, S., Wang, Y. (2017). Artificial intelligence in healthcare: past, present and future. *Stroke and Vascular Neurology*, 2(4), 230–243. doi:10.1136/svn-2017-000101
- [3] Bahadur Chandra, T., Verma, K., Kumar Singh, B., Jain, D., & Singh Netam, S. (2020). Coronavirus Disease (COVID-19) Detection in Chest X-Ray Images using Majority Voting Based Classifier Ensemble. *Expert Systems with Applications*, 113909. doi:10.1016/j.eswa.2020.113909
- [4] Ambad, Pravin S. and A. S. Shirsat. "An Image Analysis System to Detect Skin Diseases." *VLSI IOSR Journal of VLSI and Signal Processing* 06 (2016): 17-25.
- [5] R S Gound, Priyanka S Gadre, Jyoti B Gaikwad and Priyanka K Wagh." Skin Disease Diagnosis System using Image Processing and Data Mining." *International Journal of Computer Applications* 179 (16): 38–40, January 2018
- [6] Li-sheng Wei, Tao Ji, Quan Gan, "Dermatology Diagnosis Method Based on Texture Features on Image Color and Mathematical and Computational Methods in Medicine", vol. 2018, Article ID 8145713, 10 pages, 2018.
- [7] Himanshu Kumar, Yasha Hasija, and Lakshay Bajaj. Automatic System for Prediction of Skin Disease using Image Processing and Machine Learning. *International Journal of Computer Applications* 180(19) page:9--12, February 2018.
- [8] Rahman, Md & Yasir, Rahat & Ahmed, Nova. (2015). Dermatological disease detection using image processing and artificial neural network. 687--690. 10.1109/ICECE.2014.7026918.
- [9] Dataset of pneumonia - :<https://www.kaggle.com/paultimothymooney/chest-xray-pneumonia>
- [10] Datasets of covid19-: <https://www.kaggle.com/allen-institute-for-ai/CORD-19-research-challenge>
- [11] Chest X-Ray image (pneumonia) <https://www.kaggle.com/paultimothymooney/chest-xray-pneumonia>

