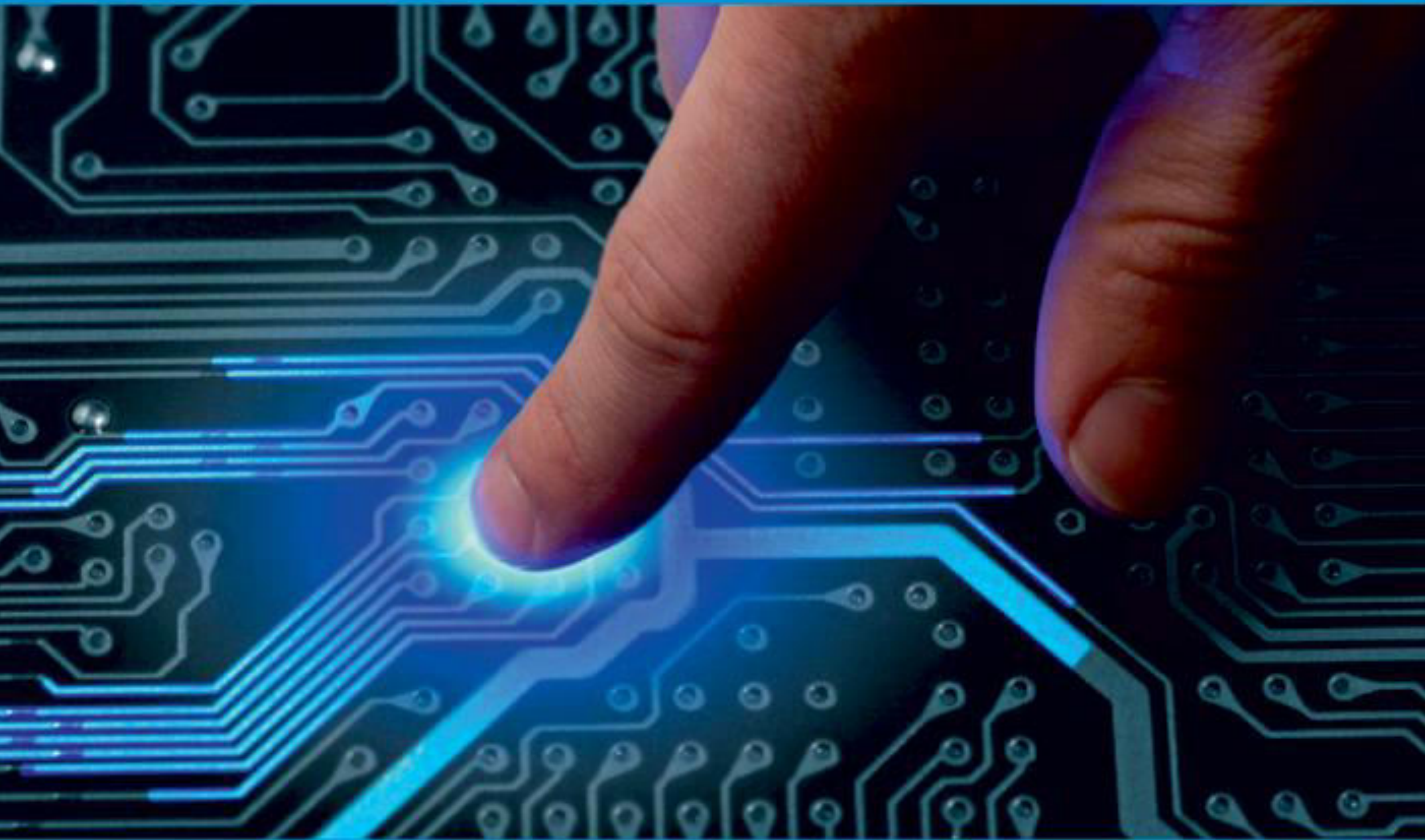
IJIRCCE

e-ISSN: 2320-9801 | p-ISSN: 2320-9798



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

Volume 10, Issue 7, July 2022

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

Impact Factor: 8.165

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.165

|| Volume 10, Issue 7, July 2022 ||

| DOI: 10.15680/IJIRCCE.2022.1007082 |

Prediction and Prescription of Lung Disease by Image Focusing on CT-Scan Using Deep Learning

Mr. N. S. Patil M.Tech [1], **Ms. Pravallika G. R.**[2], **Ms. Shreya K. Bhat**[3], **Ms. Suman S. Y.**[4], **Mr. Vishal S. Meharwade**[5]

Assistant Professor, Department of Information Science and Engineering , Bapuji Institute of Engineering and Technology, Davangere, Karnataka, India[1]

Department of Information Science and Engineering, Bapuji Institute of Engineering and Technology, Davangere, Karnataka, India[2]

Department of Information Science and Engineering, Bapuji Institute of Engineering and Technology, Davangere, Karnataka, India[3]

Department of Information Science and Engineering, Bapuji Institute of Engineering and Technology, Davangere, Karnataka, India[4]

Department of Information Science and Engineering, Bapuji Institute of Engineering and Technology, Davangere, Karnataka, India[5]

ABSTRACT: In recent years, lung illness and how to characterise it has been one of the most fascinating subjects to investigate. The amount of medical image databases is increasing rapidly to detect infections in hospitals because of the many diverse ways that medical pictures are utilised in hospitals, pathology laboratories, and diagnostic centres. The application of deep learning to discover lung ailments is thus quite common. Deep learning may be used to identify lung illness in medical photos, as shown here. A skin test, blood test, sputum sample test, or chest X-ray are often used to detect lung disease. CT scan pictures were utilised in this example, and CNN was employed to look for patterns in these images. However.

KEYWORDS: Lung Diseases, Computed Tomography, Deep Learning.

I. INTRODUCTION

The airways of the lungs and other organs of the respiratory system are affected by lung illnesses, often known as respiratory disorders. Pneumonia, TB, and the Coronavirus Disease 2019 are just a few instances of respiratory illnesses (COVID-19). It is estimated that 334 million individuals throughout the world suffer with asthma, according to the Forum of International Respiratory Societies. Millions die from TB, 1.6 million people die from lung cancer, and 1.4 million people die every year from pneumonia. The epidemic of COVID-19 was global in scope. Health care services were placed under a lot of strain as a result of the large number of persons affected. Lung illness is one of the leading causes of death and disability in the world today. Early detection is critical to ensuring that a patient recovers and lives a longer life. An algorithm that mimics the way the brain functions and how it is pieced together is called deep learning in machine learning. With the latest advances in artificial intelligence, particularly deep learning, finding patterns in medical imagery is simpler than ever. These improvements were made feasible by deep learning's capacity to learn features from data rather than hand-designing features based on domain-specific expertise. It's just a matter of time until deep learning becomes the new standard for many medical applications. The treatment of pulmonary nodule disease, pulmonary embolism, pneumonia, and interstitial lung disease may also benefit greatly from the use of deep learning methods. Several typical deep learning network architectures for medical image processing are also examined. One of

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.165

|| Volume 10, Issue 7, July 2022 ||

| DOI: 10.15680/IJIRCCE.2022.1007082 |

the best ways to assist readers grasp a subject is to use a taxonomy, which puts together similar pieces of work into categories. However, a trend analysis provides an overview of the research direction on the subject of interest, based on previous study. Here are the project's objectives: Develop a taxonomy for the latest deep learning-based lung disease detection systems. 2) Draw a picture of the most current developments in the field.

II. LITERATURE REVIEW

AReviewLungDiseaseDetectionUsingDeepLearning

One of the most intriguing areas of study in the last several years has been lung illness and how to explain it. Medical picture collections are developing at a rapid pace to keep up with the ever-increasing number of illnesses being treated in hospitals, pathology laboratories, and diagnostic centres. No matter how much study is done on the issue, it remains perplexing and difficult to comprehend. In the written word, there are several methods to categorise medical imagery. There is a huge disconnect between what imaging machines pick up at the lowest levels and what a human brain can grasp at the highest levels when using standard techniques. To deal with the difficulty of querying and managing enormous datasets, the deep convolutional neural network was created. Computer vision and medical engineering have benefited greatly from recent advances in deep learning algorithms. Here, we suggested and evaluated a deep convolutional neural network for sorting chest disorders into categories. The suggested model is made up of convolutional layers, ReLU activations, a pooling layer, and a fully connected layer. The last layer, which includes fifteen output units, has all connections done. Outputs for each of the 15 illnesses will indicate how probable it is that one of them will occur. The pictures used to train this model are from a publicly accessible dataset named Chest X-Ray 14. As a result, there are fifteen distinct classifications in this data set: Atelectasis; Cardiomegaly; Effusion; Infiltration; Mass; Nodule; Phthisis; Pneumothorax; consolidation; edoema; emphysema; fibrosis; lung thickening; hernia; and No Finding. This approach is quite good at categorising items into many groups. An average accuracy of 89.77% is achieved when diverse illnesses are grouped together. With the use of this data, we can see that we have a viable model. Classifying medical photos for various thoracic disorders is made easier with the help of the new technique.

A Survey of Deep Learning for Lung Disease Detection on Medical Images:State-of-the-Art,Taxonomy,Issues and Future Directions

Research on the application of deep learning to detect lung illness is extensive. There has been just one survey publication in the previous five years that looked at the most current studies on this issue, according to our knowledge. These authors explore the history of deep learning and how it might be used to pulmonary image acquisition. The treatment of pulmonary nodule disease, pulmonary embolism, pneumonia, and interstitial lung disease may also benefit greatly from the use of deep learning methods. Several typical deep learning network architectures for medical image processing are also examined. A taxonomy and explanation of how current work has evolved are absent from their survey. One of the best ways to assist readers grasp a subject is to use a taxonomy, which puts together similar pieces of work into categories. However, a trend analysis provides an overview of the research direction on the subject of interest, based on previous study. Deep learning applications for lung disorders are described in this research, along with a trend analysis. Also discussed are the remaining issues and potential solutions.

ProblemStatement

There are many ways to figure out what kind of lung disease is being shown by a CT scan or X-ray, but the final result depends on how accurate the algorithm is. There is also another case that needs to be taken into account: if the algorithm predicts the same likelihood of different symptoms of different lung diseases, it is hard to figure out which disease it is. The accuracy needs to be improved so that the symptoms and different stages of lung cancer and other diseases can be correctly grouped. Convolutional Neural Network can be used to do this (CNN).

Objectives

1. To make a system that takes a dataset as an input and uses it to make a learning model that will be used for classification.
2. To teach the learning model by giving it images from the CT-scan that will be sorted into different types of lung disease.
3. To organise the different stages of a lung disease that has been found and compare it to a learning model.
4. To make a prescription for the disease that was found, which would be saved in the database.

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.165

|| Volume 10, Issue 7, July 2022 ||

| DOI: 10.15680/IJIRCCE.2022.1007082 |

Existing System

An image's categorization and detection are critical components of determining what's wrong with it. Radiologists benefit from the use of computer-aided diagnostic (CAD) systems, which helps in the diagnosis process. A computer-aided detection (CADe) algorithm discovers abnormal lesions, while a computer-aided diagnosis (CADx) algorithm distinguishes between benign and malignant abnormal lesions. These two kinds of CAD algorithms are available.

Kaggle just released a significant collection of X-ray lung data and lung illness data. Machine Learning and Deep Learning are used to determine whether or not the patient has a lung illness as part of this research. A yes-or-no response is the only result of this project, which uses patient data as input and output.

Proposed system

Our proposed system will use deep learning and CNN, which is great for finding patterns in images, to look for all possible lung diseases that could be caused by deep learning. CT-scans are less expensive and more accurate than other methods. It takes images of the patient's body and turns them into cross-sectional images on different depth planes. Here, we predict and treat diseases that our system has found.

III. SYSTEM DESIGN

CT scans of COVID-19 and viral pneumonia were utilised, as well as pictures of a stable chest, to see how effectively pre-trained Convolutional Neural Networks could automatically analyse COVID-19 using high-tech CT scan data. The unintentional finding of COVID-19 has been attributed to the use of pre-trained transfer models such as Inception, VGG16, RestNet, Inception, and Xception on CT scans. We used 116 Covid and 317 Regular CT scans to do this. For the training stage, we used a 2-dimensional global mean pooling sheet and a sheet that was fully connected using the ReLU activation function. According to Fig. below, we classified the final result as a collection of CT scans that were either normal or had COVID-19+ve illness, as demonstrated.

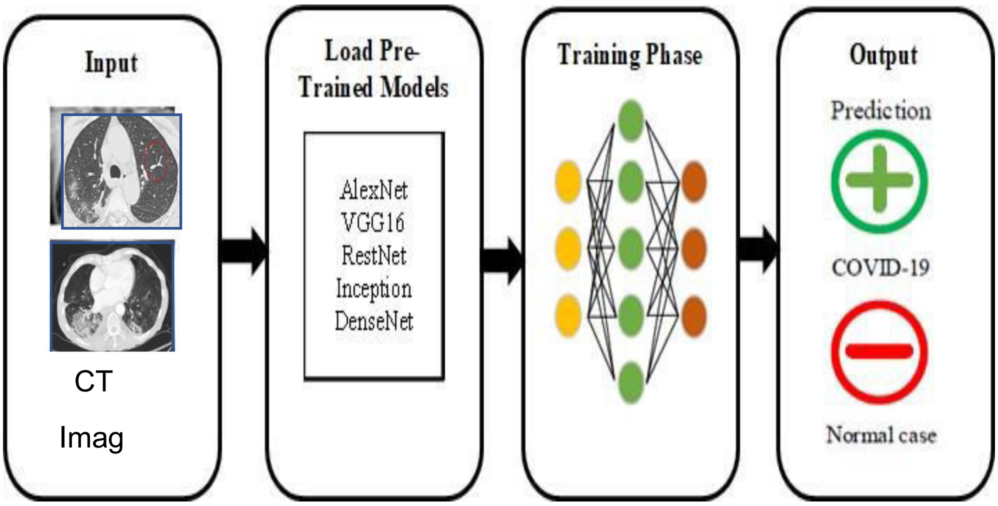


Fig: Proposed Architecture

To see how effectively high-tech pre-trained Convolutional Neural Networks can automatically analyse X-ray pictures for TB, we utilised a library of TB chest X-ray photos. Unintentionally discovering TB may be as simple as using an X-ray picture with a deep convolution neural network and a pre-trained transfer model. The TB X-ray picture order was recorded and the 2-dimensional global mean pooling sheet and the fully connected sheet by the ReLU activation function were employed in the training stage to achieve these aims. Finally, as indicated in Figure, we defined the outcome as the classification of X-ray pictures as TB or non-TB illness.

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.165

|| Volume 10, Issue 7, July 2022 ||

| DOI: 10.15680/IJIRCCE.2022.1007082 |

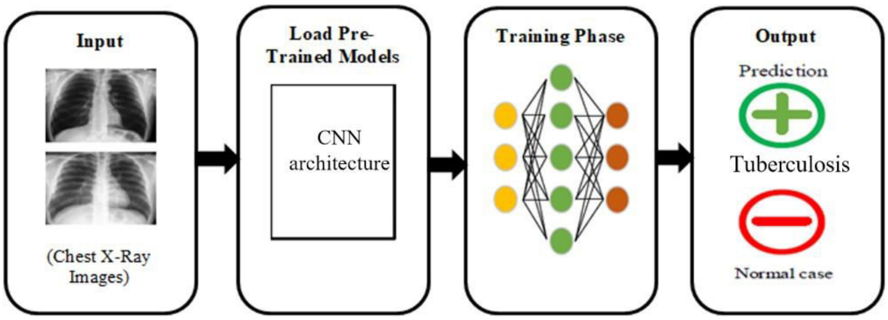
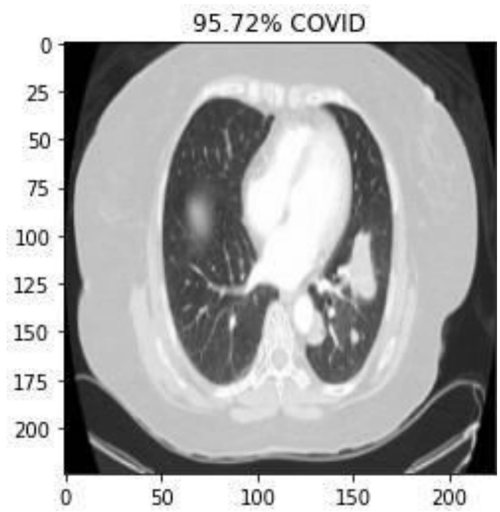


Fig: Proposed Architecture

IV. RESULTS AND DISCUSSION

OutputSnapshots(Covid-19)

The snapshots show an idea of the method being proposed. These are the pictures that were taken while the code in the given method was being run correctly.



	precision	recall	f1-score	support
0	0.93	0.93	0.93	70
1	0.94	0.94	0.94	80
accuracy			0.93	150
macro avg	0.93	0.93	0.93	150
weighted avg	0.93	0.93	0.93	150

	precision	recall	f1-score	support
0	0.88	0.97	0.93	70
1	0.97	0.89	0.93	80
accuracy			0.93	150
macro avg	0.93	0.93	0.93	150
weighted avg	0.93	0.93	0.93	150

International Journal of Innovative Research in Computer and Communication Engineering

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.165

|| Volume 10, Issue 7, July 2022 ||

| DOI: 10.15680/IJIRCCE.2022.1007082 |

	precision	recall	f1-score	support
0	0.82	0.73	0.77	70
1	0.78	0.86	0.82	80
accuracy			0.80	150
macro avg	0.80	0.80	0.80	150
weighted avg	0.80	0.80	0.80	150

	precision	recall	f1-score	support
0	0.92	0.97	0.94	70
1	0.97	0.93	0.95	80
accuracy			0.95	150
macro avg	0.95	0.95	0.95	150
weighted avg	0.95	0.95	0.95	150

Fig: Classification Reports for CT Scans: VGG, Inception V3, Res Net 50, Xception

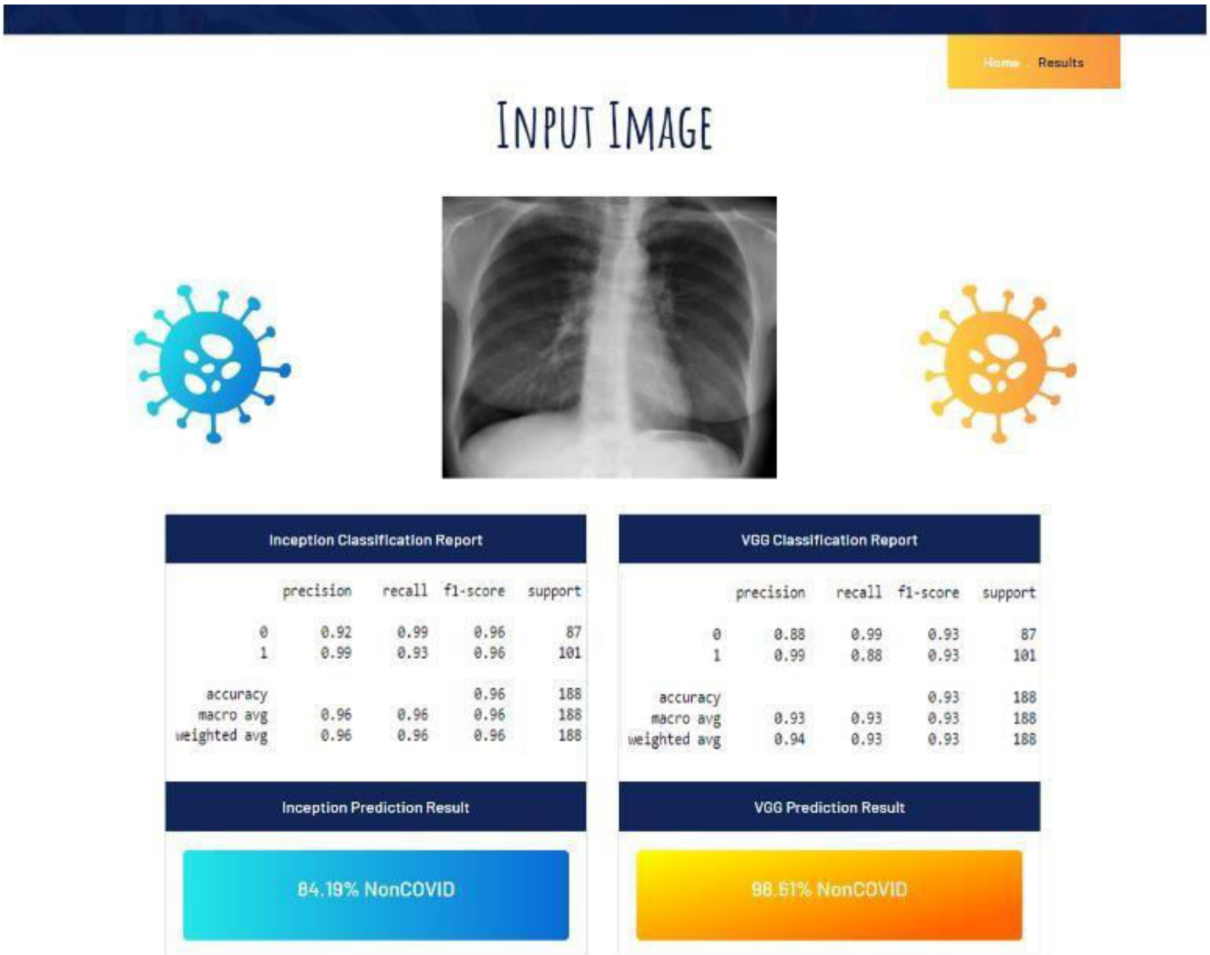


Fig: Output in Application

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.165

|| Volume 10, Issue 7, July 2022 ||

| DOI: 10.15680/IJIRCCE.2022.1007082 |

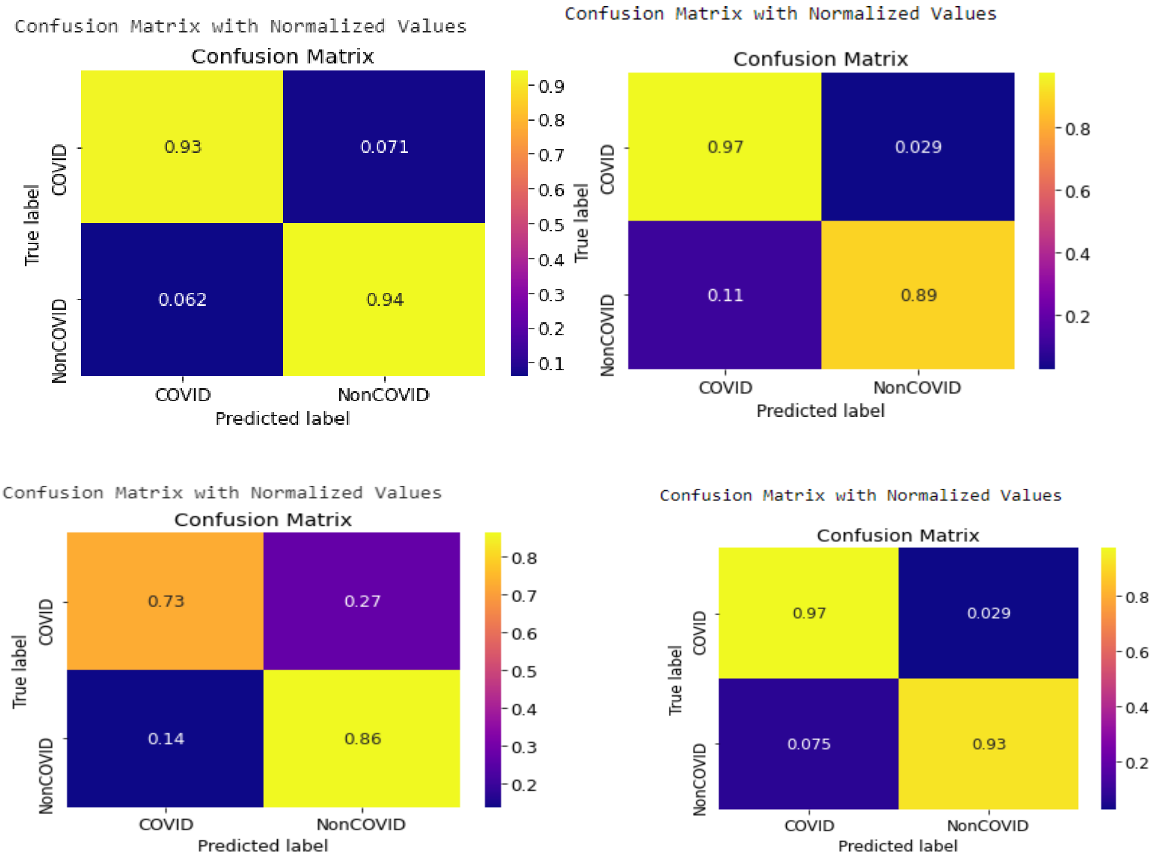


Fig: Confusion Matrix for CT Scans: VGG, InceptionV3,ResNet50, Xception

Output Snapshots(Tuberculosis)

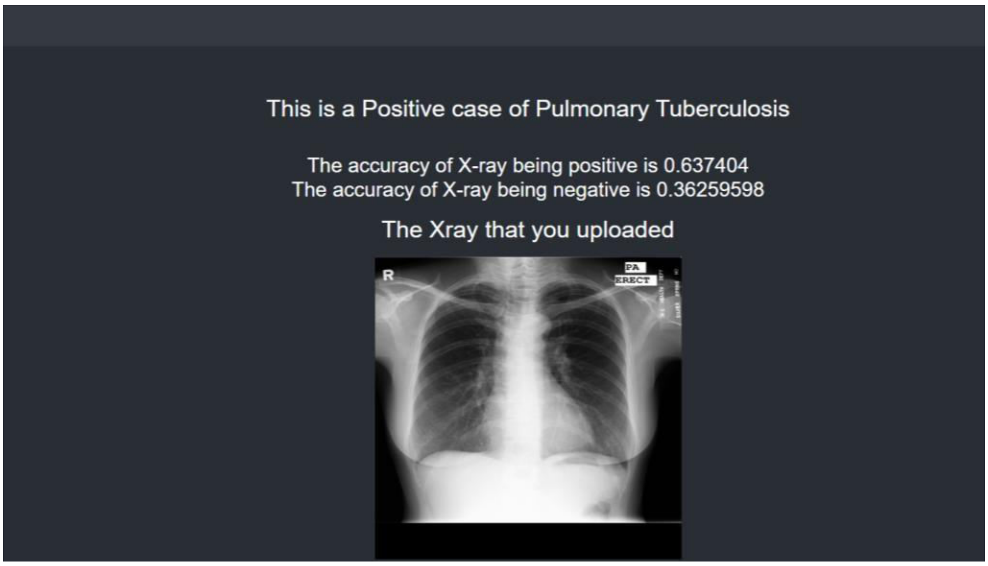


Fig.Accuracy oftheTBDisease

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.165

|| Volume 10, Issue 7, July 2022 ||

| DOI: 10.15680/IJIRCCE.2022.1007082 |

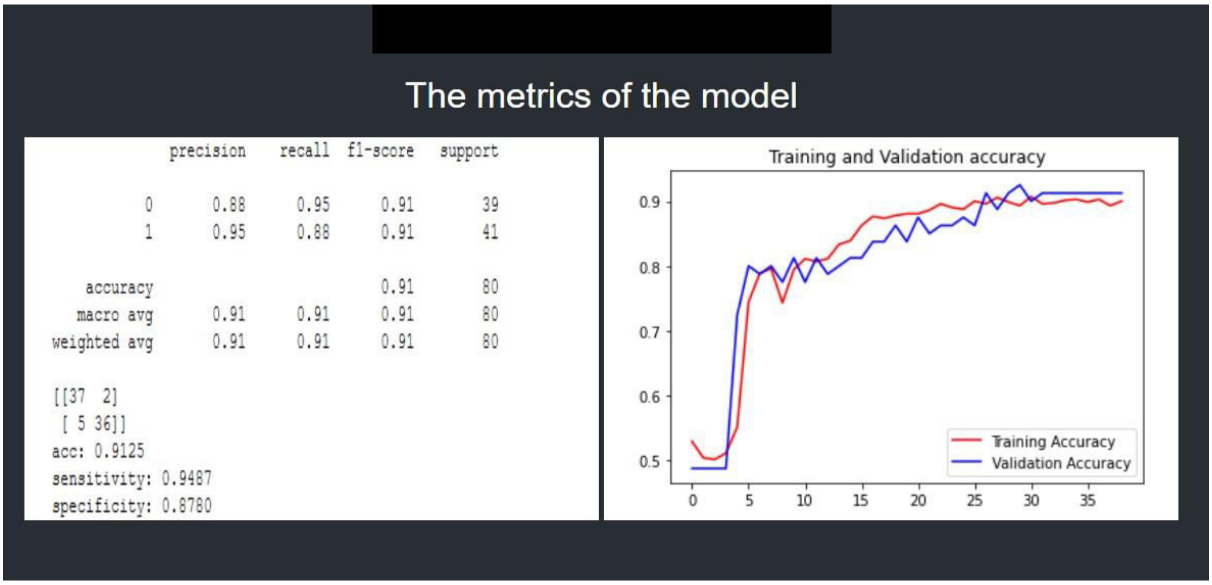


Fig. Training and Validation Accuracy

V. CONCLUSION

So as for selecting finest cure and to avoid the widespread dissemination of the disease, early identification of patients with the current coronavirus is important. Our findings indicate that the usage of deep learning models like RestNet, Inception, VGG16 and Xception is used for extracting traits, implement principle of transfer learning, and later identify these traits by combined deep learning techniques as an efficient method for classifying Xray images like regular or positive for COVID-19 with an overall accuracy of 92%. Our elevated precision discoveries are useful for doctors and investigators for making choices for medical training.

REFERENCES

[1] “A Review Lung Disease Detection Using Deep Learning” Siddhanth Tripathi, SinchanaShetty,SomilJain,Vanshika Sharma

[2] “A Survey of Deep Learning for Lung Disease Detection on Medical Images: State-of-the-Art,Taxonomy,IssuesandFutureDirections”

[3] Stefanus Tao Hwa Kieu1 , Abdullah Bade 1 , Mohd Hanafi Ahmad Hijazi 2,* and HoshangKolivand[4] Jacob DC Ross, “Understanding Facial Expressions for Autistic Kids”, Jacob DCRoss;1stedition(March4,2015)

Websites:https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0255886

https://www.researchgate.net/publication/352561400_Lung_Disease_Detection_Using_Deep_ Learning

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING