

## PNEUMONIA DETECTION USING DEEP LEARNING MODEL

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**Abstract:** Acute respiratory tract infection (ARTI) that affects the lungs is known as pneumonia. Either bacteria, viruses, or fungus are at blame. The most common sickness in children under the age of five is pneumonia. Nearly 7,00,000 youngsters suffer from this illness annually. Therefore, it is crucial to get a precise diagnosis of this disease. Therefore, it is vital for the experienced radiologist to detect the disease from the chest x-ray images. However, in other instances, doctors fail or there aren't any available professional radiologists in some of the poorer nations. To provide an early diagnosis for the sick person, a software-based support system is necessary to detect pneumonia utilizing chest X-ray pictures. Therefore, the goal of this research is to create a software programmer that can identify the illness pneumonia from chest x-ray images. The chest x-ray images are examined, trained, and validated utilizing many convolutional neural network layers to do this. To extract the high-level features from the photos, the I model, a deep CNN with 48 layers, is used. According to the test results, the programmer is able to distinguish between photos that are contaminated and those that are not. Because of this, this initiative can accurately identify the condition from chest x-ray scans more than 95% of the time.

**Keywords:** - Acute respiratory tract infection (ARTI), Deep CNN, Pneumonia.

### I Introduction

Artificial intelligence systems called neural networks use biologically inspired neuron topologies to process inputs and generate outputs. This paper previously referenced machine learning. Machine learning is necessary for neural networks to be helpful. Using inputs as training data, neural networks are taught to identify patterns and generate valuable outputs. In contrast to conventional algorithmic programming, neural networks do not adhere to a set of steps. Even worse, they cannot be programmed. Rather, they gain knowledge from example inputs. But as the article "Neural Networks" points out.

Since neural networks cannot be designed to carry out specific tasks, when they malfunction, they are particularly challenging to fix. The network's operator lacks the tools necessary to "correct an issue." In spite of this flaw, neural networks are nonetheless more effective than algorithms for some jobs, particularly those that are poorly defined or understood. Neural networks have many diverse applications. They are capable of carrying out a variety of computer vision tasks, including face recognition, interpretation of visual data for predictions, and even acting as expert systems to make medical diagnosis.

### 2 Literature survey

In 2019, Enes Ayan et al., [1] proposed a methodology for the analysis of pneumonia from chest x-beam pictures utilizing profound learning procedures. In this methodology they have utilized two notable convolution neural organization models Xception and Vgg16 for diagnosing pneumonia. They have utilized exchange learning and calibrating for their preparation stage. For the exchange learning strategy they have used the DenseNet-121 layer convolution neural organization it is otherwise called CheXNet. They prepared their organization with 10,000 frontal view chest X-beam pictures with 14 unique infections and accomplished 90% of precision. Further, the cycle has been partitioned into two organizations, their first organization depends on the Xception model and the subsequent one is Vgg16 based model. At that point, the two models are thought to be dependent on their exhibition and the outcome shows the Xception model outflanks the Vgg16 model in diagnosing pneumonia.

The test aftereffects of their methodology in Vgg16 organization and Xception network are at the exactness with 82%, 87% separately.

In 2017, Abhishek Sharma et al., [2] proposed Finding ways to automate diagnostics from medical images, has continuously been one of the most interesting areas of software development. This article presents a novel approach for detecting the presence of pneumonia clouds in chest X-rays (CXR) by using only Image processing techniques.

In 2016 Ronald Barrientos et al. [3] proposed Pneumonia is one of the major causes of child mortality. Unfortunately, in developing countries there is a lack of infrastructure and medical experts in rural areas to provide the required diagnostics opportunely. In 2015 Vanhoucke Sergey et al. [4] proposed Pneumonia is a form of acute respiratory tract infection (ARTI) that affects the lungs which is caused by bacteria, viruses or fungi. Pneumonia is the leading disease that occurs more in children of age below 5 years. In 2019, M. Haenlein et al., [5]. In 2020 V. Kaul et al., [6] Artificial intelligence (AI) is a new technical discipline that uses computer technology to research and develop the theory, method, technique, and application system for the simulation, extension, and expansion of human intelligence. In 1969 M. Minsky et al., [7] Despite considerable research efforts, pancreatic cancer is associated with a dire prognosis and a 5-year survival rate of only 10%. Early symptoms of the disease are mostly nonspecific. In 2019 A. Esteva et al [8] Here we present deep-learning techniques for healthcare, centering our discussion on deep learning in computer vision, natural language processing, reinforcement learning, and generalized methods. In 2017 D. Ravi et al., [9] With a massive influx of multimodality data, the role of data analytics in health informatics has grown rapidly in the last decade. This has also prompted increasing interests in the generation of analytical, data driven models based on machine learning in health informatics. In 2019 Y.J. Yang et al., [10] Artificial intelligence (AI) using deep-learning (DL) has emerged as a breakthrough computer technology. By the era of big data, the accumulation of an enormous number of digital images and medical records drove the need for the utilization of AI to efficiently deal with these data,

which have become fundamental resources for a machine to learn by itself.

### 3. Methodology

In deep learning keras is an easy to understand neural organization library written in python. Deep learning is a continuously predominant subset of AI. Profound learning models are constructed utilizing neural organizations. A neural organization takes in data sources, which are by then dealt with in concealed layers using the loads that are adjusted during preparing. At that point the model spits out an expectation, in which all of this process is shown in the Fig-1. The weights are balanced to discover patterns in order to form way better predictions. The user does not have to indicate what designs are to be searched for the neural network it learns on itself during the process.

This project has been able to identify whether a person has pneumonia or not. The training, testing and validating of the Chest X-ray images that are taken from Kaggle is achieved successfully. By using the Deep CNN model for testing, training and validating. The images were successfully resized, rescaled and made into batches using the keras model. Further, the model was tested by giving several images which were made into batches as input. And the result shows the images as Normal or Pneumonia. Therefore, at this step the completion of the basic training and testing part of the project is done.

Then, further working of the application program interface which involves html code. Basically, the user gets an option such as select image. Users can select any chest x-ray image either from the dataset or Google. Once after uploading the image, the user gets an option to predict. Once this option is clicked the result is obtained which tells that particular chest x-ray image is normal or infected by pneumonia. The images that are taken from Google are also further stored in our dataset. This process helps the model to get trained even more. So, that the accuracy of the project increases.

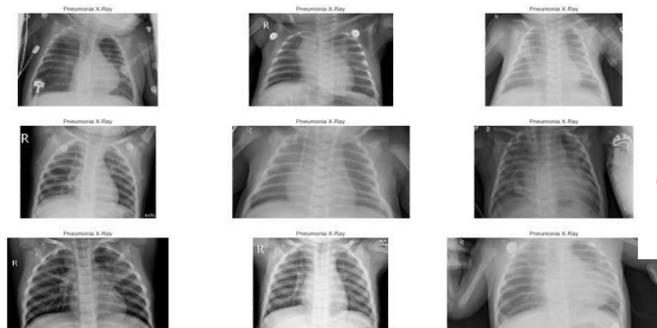


Fig 1: Sample Images from the Dataset

```
624/624 [=====] - 11s 18ms/step
Loss of the model is - 0.30433156475042683
624/624 [=====] - 10s 15ms/step
Accuracy of the model is - 91.98718070983887 %
```

Fig 3: Accuracy Of Model

MODULES

- Getting the Data
- Checking the Data
- Training the Models
- Evaluating the Model
- Model Saving and Loading

4. Results and Evaluation Metrics

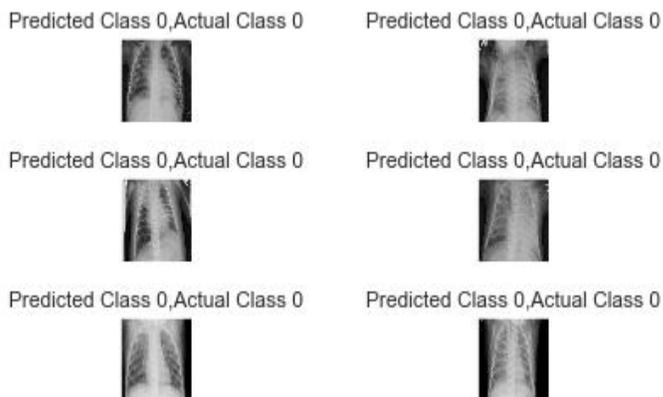


Fig 4: Some of The Predicted Images

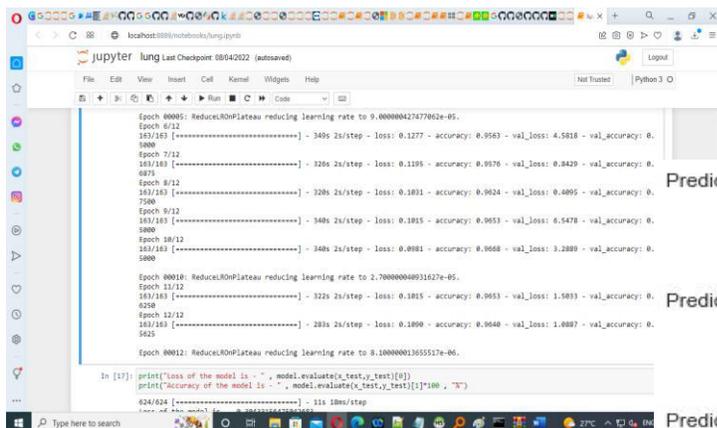


Fig 2: Training the Model

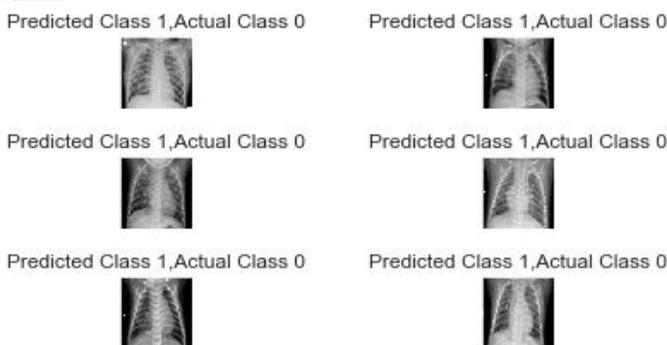
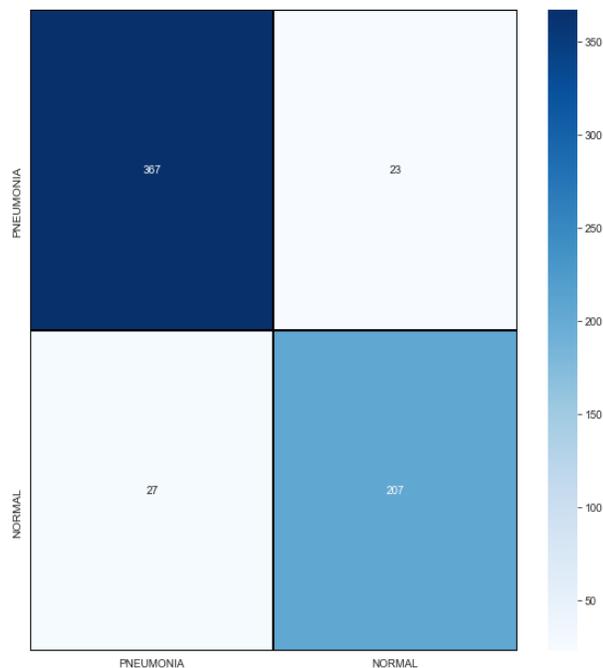


Fig5: Pneumonia Predicted Images



**Fig6: Confusion Matrix**

We have used 12 Epochs for our deep learning model. With every epoch, accuracy gets increased and the final accuracy comes out around 92%. We've also created a confusion matrix.

## 5. Conclusion

Respiratory system is one of the important parts of our body. As pneumonia can be caused by various viruses and bacteria, it is very important to diagnose it as early as possible since it will lead to death. To enhance the system in pneumonia detection in the underdeveloped and developing countries, such as in countries like India where we do not have expert radiologists and also the poverty that is being currently faced by rural areas, we have identified an accurate system to detect the pneumonia infected individuals. This type of tool can be of immense help to the poor people who require urgent medical care.

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