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Detection of Covid 19/ Pneumonia by using Machine Learning Techniques

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***Abstract*—Millions of individuals worldwide were infected by the pandemic illness known as COVID 19. On the other hand, pneumonia is a condition that results in a lung infection that causes the air sacs to enlarge, making breathing difficult and occasionally fatal. As a result, the Kaggle data repository is where the CT pictures of both pneumonia and the COVID 19 are found. The widespread demands for diagnosis caused by the COVID-19 and pneumonia have given rise to the development of more sophisticated, quick to react, and effective detection techniques. An image processing-optimized convolution neutral network model is created using machine learning techniques with the aid of Google Colab software. Kaggle provided 5425 photos for use. Using the CT scan and X-rays pictures as dataset, a straight forward convolution neural network (CNN) and modified Alex Net model are implemented. The experiments' findings indicate that the models in use can deliver accuracy of up to 90%. This highly effective method of identifying both diseases cuts down on time significantly and prepares the path for a sophisticated diagnosis system.**

***Index Terms*— COVID, Pneumonia, Kaggle, Alexnet, CNN, Accuracy.**

I. INTRODUCTION

In Pandemic, every minute is prized highly. Sadly, because of the corona virusemergency, inpatients are required to undergo the corona virus test, which could take up to 14 hours. Our team had been working on a mechanism t o allow patients' toskip the test if they had already undergone a CT scan. This could have a significant impact on how much time and money are saved. The need for a secondary clinical test to determine if a patient is covid po sitive or negative was another factor that drove us to establish the project. This also holds true for the pneumonia infection. This might save the healthcare professional time, money, and misunderstanding.

A. Pneumonia

A condition known as pneumonia affects one or both lungs. The lungs' air sacs, or alveoli, fill up with liquid or discharge as a result of it. Pneumonia may be brought on by microorganisms, diseases, or growths. The symptoms can range from mild to severe and include a cough with or without mucus, a fever, chills, and difficulty breathing. The severity of the pneumonia depends on your age, general health, and the disease's origin.

B.COVID-19

An infectious condition called COVID 2019 infection (COVID-19) is brought on by (SARS-CoV-2).Although

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they vary, they typically include fever, hacking, fatigue, breathing difficulties, and a loss of taste and smell. One to fourteen days after the initial period of infection, symptoms appear. Of those who develop noticeable symptoms, the majority (81%) do so with mild to moderate adverse effects (up to mild pneumonia), 14% do so with severe symptoms (dyspnea, hypoxia, or over half a lung on imaging), and 5% do so with mild symptoms (respiratory disappointment, stun, or multi organ dysfunction). People will inevitably show serious symptoms.

II. Literature Survey

Wang et al. [1] employed ResNet152V2 as a backbone network; COVID-19 can be correctly identified from chest CT scan pictures by setting it apart from three other types of pneumonia and healthy people. By separating COVID-19 from the other four classes using the suggested architecture, a highly respectable accuracy of 88.1% is achieved. The effectiveness of the 3-fold cross-validation evaluation in this study and comparisons to previous studies demonstrate that this clever approach can be used as a screening tool in the COVID-19 assessment.
A chest CT and processing by the uAI Intelligent Assistant Analytic System [2] may successfully identify pneumonia in COVID-19 patients. The generalized linear mixed model indicated that COVID-19 pneumonia was more likely to occur in the right lower lobe's dorsal segment.
To categories Covid-19 from CT scans, the effectiveness of the texture analysis approach, machine learning method, and deep learning method were comprehensively compared. Convolution Neural Network (CNN)[3], one of the deep learning algorithms, advised automatic classification of CT lungs images for early diagnosis of Covid-19 disease. The results of deep learning were compared with machine learning algorithms. Also, the Mobilenetv2 and Alex net CNN architectures were tested and trained on.
In order to investigate the effectiveness of chest CT for diagnosing COVID-19 pneumonia, Wang et al. [4] developed a model by comparing it to a clinical model and the COVID-19 reporting and data system (CO-RADS) for the diagnosis of COVID-19 pneumonia. In this paper, a federated differentially private generative adversarial network (FedDPGAN)[5] was introduced for the detection of COVID-19 pneumonia for sustainable smart cities.
Six models were selected and combined in this study [6] to diagnose Covid-19 interstitial pneumonia in chest X-ray images. According to them, the Ensemble Machine Learning Score with the greatest accuracy. It achieves 91.8% accuracy, 93% sensitivity, and 90% specificity was the results.
This paper [7] improves the nature of the lung picture and detects cellular breakdown in the lungs by minimizing misclassification. The weighted mean histogram leveling approach is used to eliminate noise from the lung CT images. The afflicted region is split utilizing the improved plentiful grouping process to further enhance the image quality (IPCT).
This investigation's [8] objective was to ascertain whether COVID-19 pneumonia patients who were hospitalized anticipated moderate to serious respiratory failure within 48 hours, necessitating mechanical ventilation. Using the combined data from 198 patients, three predictive models were created to generate 1068 useful perceptions based on 31-factor signs and manifestations, 39-factor research centre biomarkers, and 91-factors as a synthesis of the two.

III. Proposed System

A. Acquiring and preparing data sets

The data collections are obtained from the Kaggle information vault. Then, in order to specifically test and train informational collections, the informational collections for both pneumonia and the corona virus are split into two groups.

B. Data Augmentation

In these cases, information expansion is successfully accommodated during training the models. Mathematical adjustments like flipping, rotating, translating, cropping, and scaling, as well as alterations to the shading region like shade projection, changing brilliance, and commotion injection, are some of the direct changes made to the image.

C. Model

The model used in for this project is ALEXNET model. The convolution neural network may be a specialized sort of neural network model designed for operating with two-dimensional image information, though they will be used with one-dimensional and three-dimensional information.

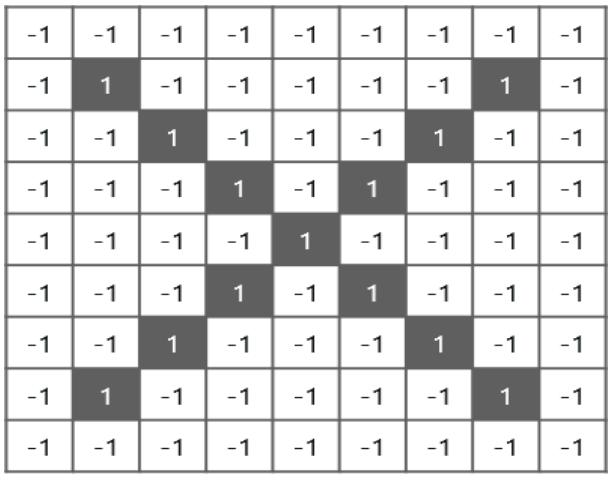

Figure.1. Implementation of different pixels

We could find a tonne of missing pixels if we regularly looked for and compared values between a normal imag e and another "x" rendition.

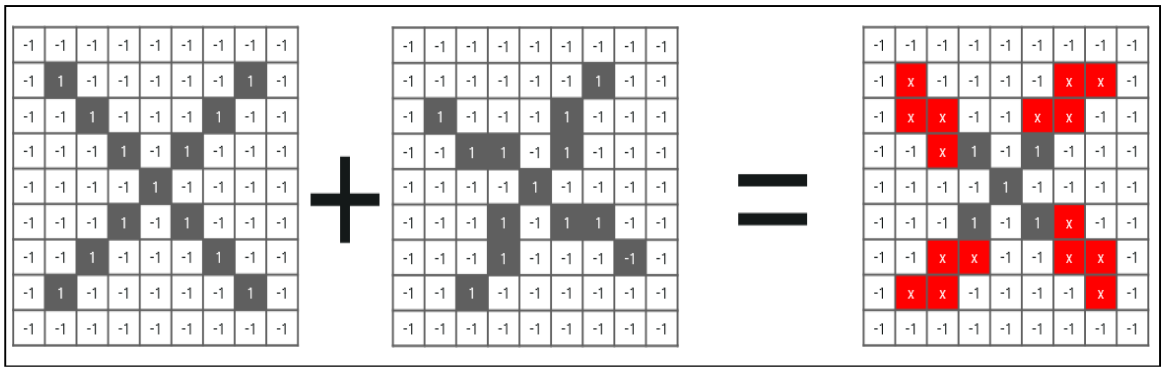

Figure.2.Comparison of image pixels

To determine if we have a match, these little patches of pixels, known as filters, are extracted and compared to ones in nearby areas that correspond to them. Instead of directly attempting to match the entire image, the Convolution Neural Network substantially enhances its capacity to find similarities by doing this.

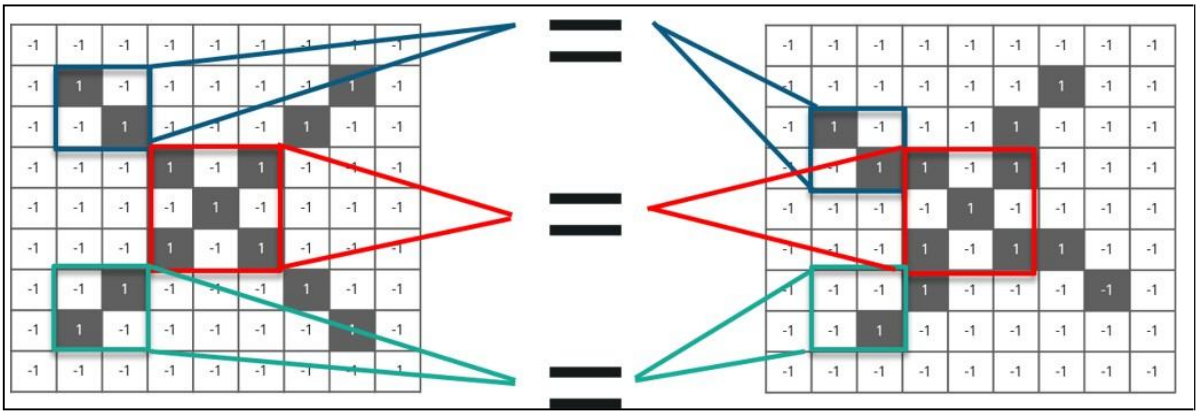

Figure 3.Pixel filtering for CNN network

D. Convolution

Convolution benefits from being post - translational invariant. This implies that each convolution filter represents an important feature, and the algorithmic Convolution Neural Network software learns which features

make up the resulting reference. There are 4 steps for convolution. First step involves the alignment of image and Features. Second step is image pixel is multiplied by its corresponding feature pixel. Third step involves adding the result and computing the sum and the final step is divide the result by feature's total number of pixels. Consider the on top of image –it tends to show the first two phases completed. Then it usually considers a feature image and one element from it. Additionally, this is increased with the current image, and the product is kept in a different buffer feature image. The final two steps can be finished using this image. That is in addition to the values that the crystal rectifier added together. The feature image's entire pixel variety divided by this variety. The final value obtained is then positioned in the centre of the filtered image. The filter is now moved about and applied to any area of the image.

E. ReLU Layer

ReLU is an activation function.

Rectified long measure (ReLU) rework only causes a node to be activated if the input is higher than a specific thr eshold; otherwise, the output is zero. Nonetheless, there is a linear relationship between the input and the variabl e amount as soon as the input rises above the predetermined threshold. Consider the below example:

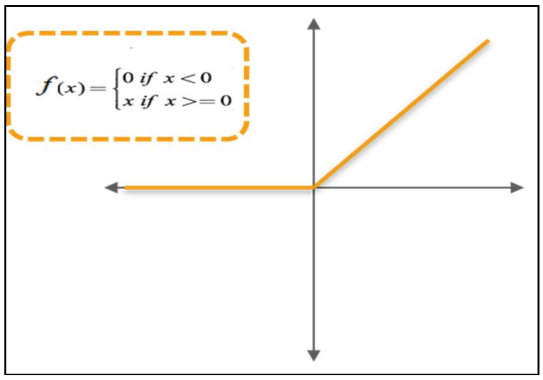

Figure.4. Relu layer

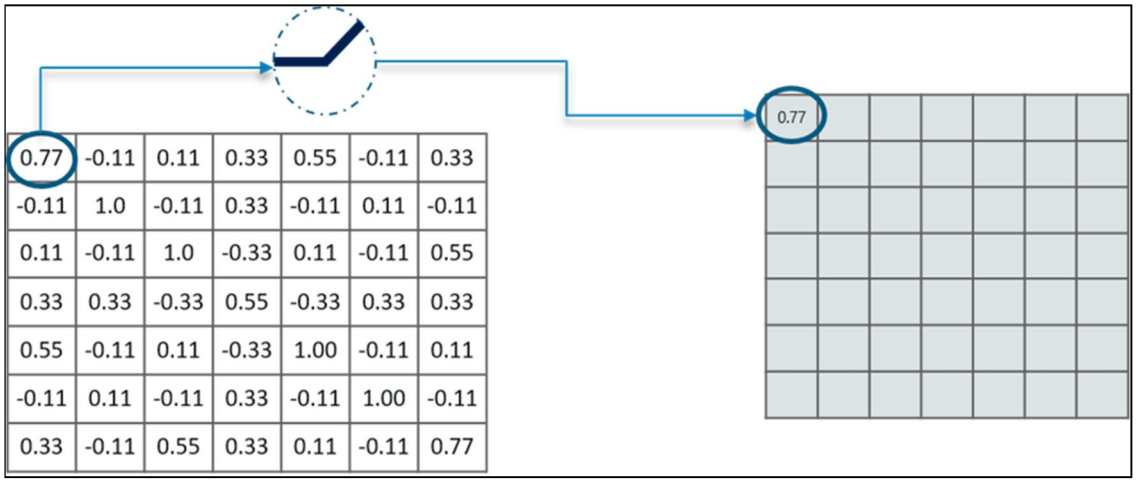

Figure.5. Removing of negative values

Getting rid of all the negative values from the convolution is the key goal. All of the positive values remain the same, but all of the negative values are changed to zero. The same approach must be taken with any or all of the opposing feature films.

F. Pooling Layer

The image stack is often shrunk in size in this layer. When a signal passes through the activation layer, pooling is complete. It is put into practice in the following four steps: First choose the window size and stride, then Glance over the filtered images and get the most out of every view. Let's use an associate's degree example to understand this. Consider acting pooling with a window size of two | two and a stride of two as well.

G. Flattening layer

After obtaining the pooled featured map, the next step is to flatten it. The entire pooling feature map matrix is flattened into a single column before being supplied to the neural network for processing.

H. Sigmoid Function

The Sigmoid operate maps any real worth into another worth between zero and one. In machine learning, sigmoid is used to map predictions to possibilities.

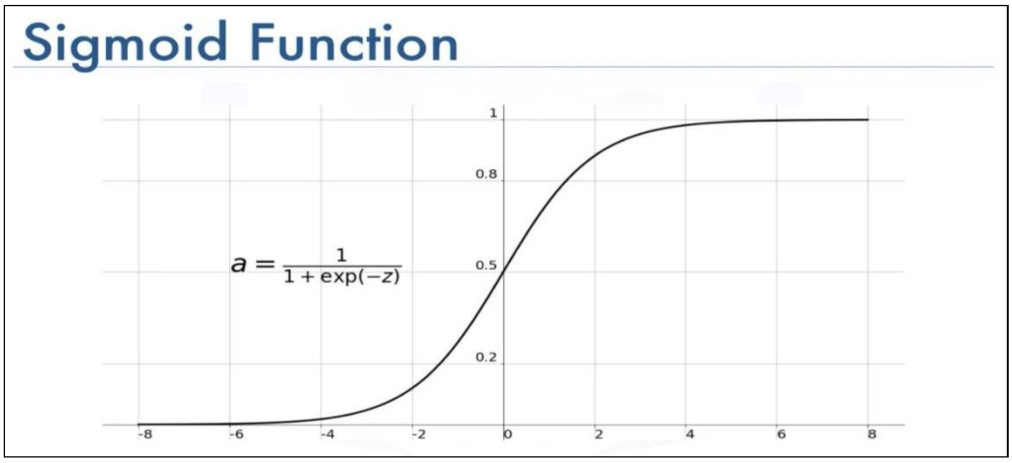

Figure.6. Sigmoid function

I. Dense Layer

Each nerve cell inside the thick layer is thought to receive input from all the neurons of its preceding layer, suggesting that the thick layer may be a deeply connected layer of the neural organization. The most frequently used layer inside the models is found to be the thick layer. Framework vector duplication is being performed inside the thick layer of the foundation.

J. Loss function

Misfortune work is utilized as menstruation of anyway reasonable a forecast model will as far as be being able to anticipate the normal result. Primary point of misfortune work to lessen the misfortune work to help the exactness of the model for higher expectations.

K. Adam optimizer

Streamlining agent's square measure calculations or ways acclimated revision the traits of the neural organization like loads and learning rate to scale back the misfortunes. Enhancer's square measure acclimated tackle streamlining issues by limiting the work. It is utilized and Adam streamlining agent, Adjective Moment Estimation is partner degree algorithmic program for improvement method for Adam enhancer. The procedure is really conservative once working with gigantic disadvantage including huge loads of data or boundaries.

L. Metrics

The metrics is to evaluate the performance model is very important. The Confusion used for finding the correctness and accuracy of the model.

M. Procedure

1. Firstly, the image data sets are obtained from a data repository Kaggle.
2. Then the images are uploaded to google drive.
3. To execute the code the program used in the project is Google Colab.
4. After the image data sets are imported into google Colab from google drive
5. Then techniques of Data visualization and data augmentation and their code is added
6. Then for image datasets labeling techniques are added. So, for Covid 19 it is labeled as 0 and pneumonia as1
7. Alexnet model is developed and the model is compiled
8. Then the entire code is executed or compiled with model summary along with parameters.

IV. Results and Discussions

When the model is prepared and executed the model is again tuned by expanding the quantity of ages or changing the model and the best is chosen as results. The model in which the accompanying outcomes are acquired is ALEXNET MODEL. Out of 3390 in pneumonia and 2035 in Covid and total 5425 the model accuracy is 90 percent.

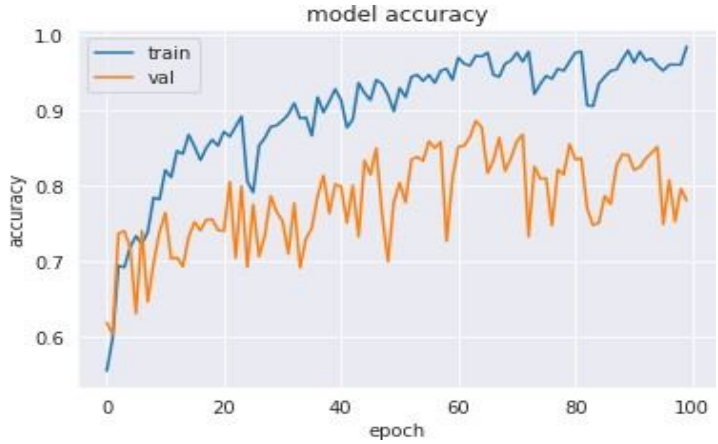

Figure.9. Model Accuracy

Loss of the model is 2.5

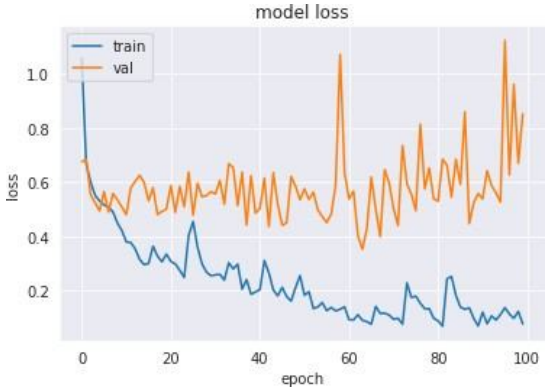

Figure.10.Model Loss

V. Conclusion

The picture informational indexes that we decide for the undertaking are pneumonia CT pictures and Covid 19 CT pictures. By utilizing the model named ALEXNET we can effectively acquire foster a code. The convolution neural organization is utilized for fostering the program. AI and profound learning procedures has a fundamental influence in this program as informational collections are prepared to give the greatest exactness. The picture informational indexes are procured from the Kaggle storehouse. Our model depicts the viability in the clinical field which can radically decrease time for basic patients. Our group fostered a program to be utilized promptly after the CT examines which medical care expert can investigate quickly to discover the infection.

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