

PNEUMONIA X-RAY IMAGE DETECTION

Domain Background

- Pneumonia is an acute infection of the lungs that produces coughing, fever, chills, muscles aches, and difficulty breathing in those who suffer from it.
- Pneumonic infection has been noted throughout human history, with mentions of the disease appearing during early Greek civilization. However, despite our long history with the disease, pneumonia remains a serious medical concern throughout the global community today, with millions of cases of pneumonia-related hospitalizations and deaths worldwide.
- Each year, over 1.5 million children die of pneumonia, mostly within developing nations.

Increasing our understanding of both the primary causative agent, *Streptococcus pneumonia*, and how we as a society have handled the management and treatment of pneumonia on a global scale may help us to increase access and efficiency of treatment options and to someday severely reduce detrimental affects of the disease.



Reference Link:

<https://www.news-medical.net/health/Pneumonia-History.aspx>

Identifying the Pneumonia disease from X-ray images in human body might be difficult through our eyes. So to improve the accuracy of finding the disease, Deep learning came into the picture by using it we can identify the pneumonia.

Convolutional neural networks have the ability to automatically extract features and learn filters. In previous machine learning solutions, features had to be manually programmed in — for example, size, color, the morphology of the cells. Utilizing Convolutional neural networks (CNN) will greatly speed up prediction time while mirroring (or even exceeding) the accuracy of clinicians.

INSPIRATION:

My inspiration is to help in Medical field by improving the accuracy of pneumonia effected X-ray images.

PROBLEM STATEMENT:

The Aim of this project is to Detect the Pneumonia by using the X-Ray Images Dataset. In this project I am going to use Keras by adding Convolution Layers.

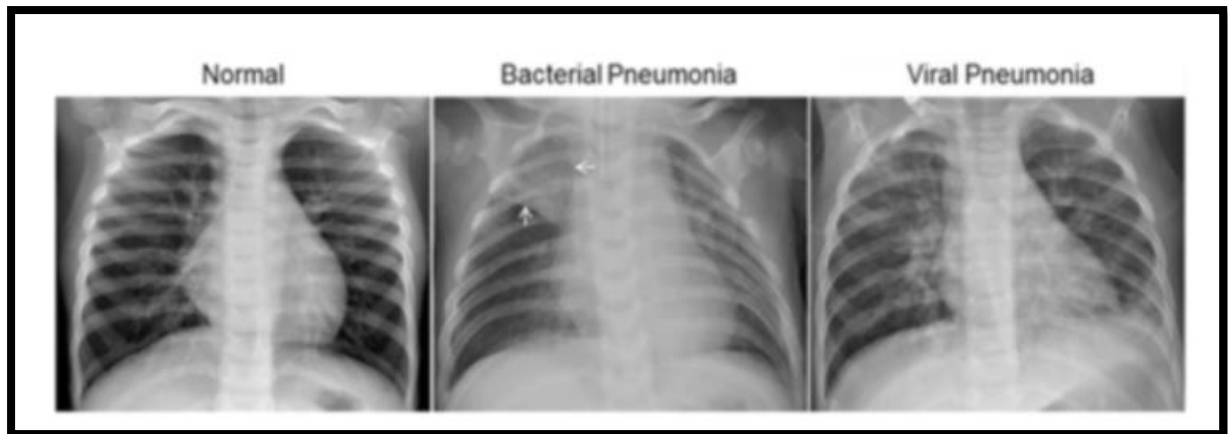
DATASETS AND INPUT:

- The dataset is organized into 3 folders (train, test, val) and contains subfolders for each image category (Pneumonia/Normal). There are 5,863 X-Ray images (JPEG) and 2 categories (Pneumonia/Normal).
- Chest X-ray images (anterior-posterior) were selected from retrospective cohorts of pediatric patients of one to five years old from Guangzhou Women and Children's Medical Center, Guangzhou. All chest X-ray imaging was performed as part of patients' routine clinical care.

For the analysis of chest x-ray images, all chest radiographs were initially screened for quality control by removing all low quality or unreadable scans. The diagnoses for the images were then graded by two expert physicians before being cleared for training the AI system. In order to account for any grading errors, the evaluation set was also checked by a third expert.

The Dataset is downloaded from

<https://www.kaggle.com/paultimothymooney/chest-xray-pneumonia>



SOLUTION:

My solution is to apply Keras by adding Convolution Layers and optimizer as 'rmsprop' and finally I am going to identify the Accuracy of pneumonia effected X-Ray Images

'rmsprop' reference Link:

<https://towardsdatascience.com/a-look-at-gradient-descent-and-rmsprop-optimizers-f77d483ef08b>

BENCHMARK MODEL:

- In this pneumonia X-ray detection, I want to set worst benchmark model by adding only one convolution Layer and Max pooling layer and dense layers with 2 units.
- I will try to improve the benchmark model accuracy by adding sufficient layers to the model

EVALUATION METRICS:

I want to use Accuracy as a evaluation metric which will give the (correct images/total number of images), and loss metric as 'binary_crossentropy' since our model has two classes ('normal','pneumonia') for both validation and testing set.

PROJECT DESIGN:

STEP 1:-Loading the train,validation,test datasets

- Since while downloading the dataset ,it is already splitted into 3 directories called train,test,val.
- I will store these train,validation,test datasets into some directory variables

STEP 2:-Create a Sequential Model

- For the Benchmark model, there will be only one convolution layer,max pooling layer and Dense layer.
- To improve these benchmark model accuracy ,I will add more layers with activation function as 'softmax' or 'sigmoid'
- If the accuracy is not sufficient ,I will try to apply GridSearch Technique for tuning the model.

STEP 3:-Visualization Results

- After the model is completed ,i will visualize the training set results as well as testing results and validation results