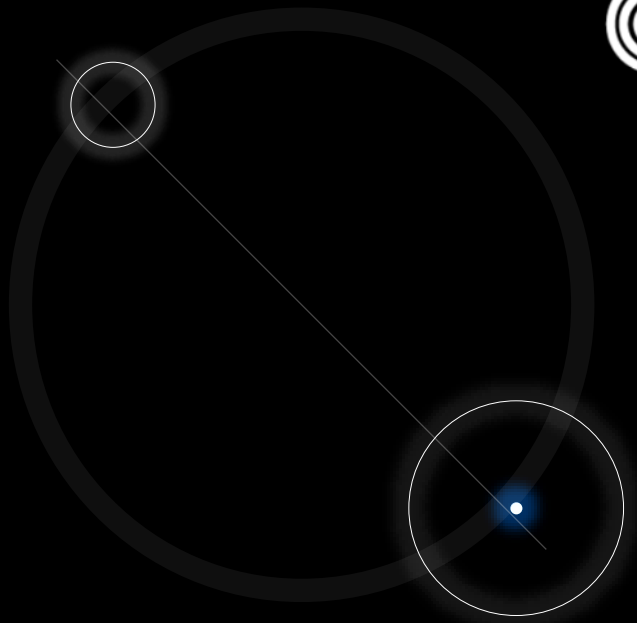

PNEUMONIA DETECTION

PROJECT BY G5 GROUP

DYPIEMR, AKURDI

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- SANIYA
- HRUSHIKESH
- RUPESH
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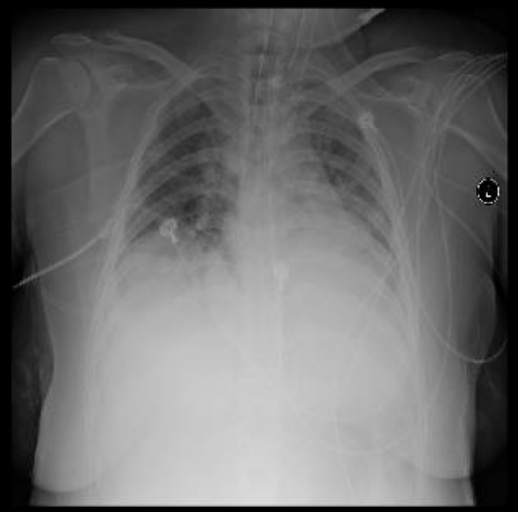


- A fast, inexpensive and reliable method to determine the type of pneumonia
- We have developed machine learning model for classification of pneumonia based only on X-RAY scan of the chest
- 89-90% accuracy

INTRODUCTION

Traditionally, doctors do the X-ray of the patient's chest then try to determine the cause with the help of it. If they fail to do that, they would ask the patient for more time consuming and expensive tests like microbial culture and sputum.

The Problem

Time

Time is crucial in identifying type of pneumonia

Financial

Expensive medical test costs like microbial culture and sputum

Death count

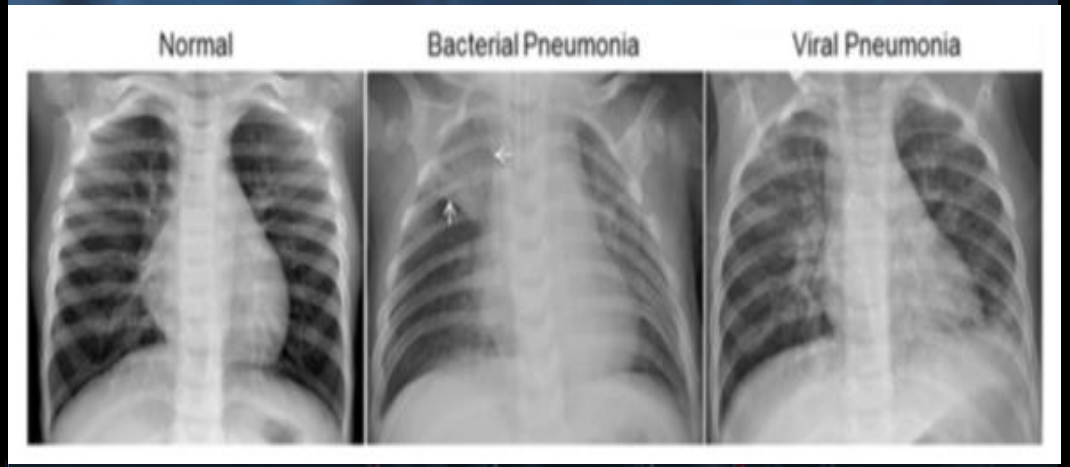
The amount of deaths due to pneumonia is decreasing year on year. However the death count still remains significant.

Cause

Take X-ray of the patient's chest then try to determine the cause

Diagnosis

One of the major problem doctor's encounter during diagnosis of pneumonia is identifying the type of pneumonia



SOLUTION

A HIGH ACCURACY ML MODEL

Faster Results

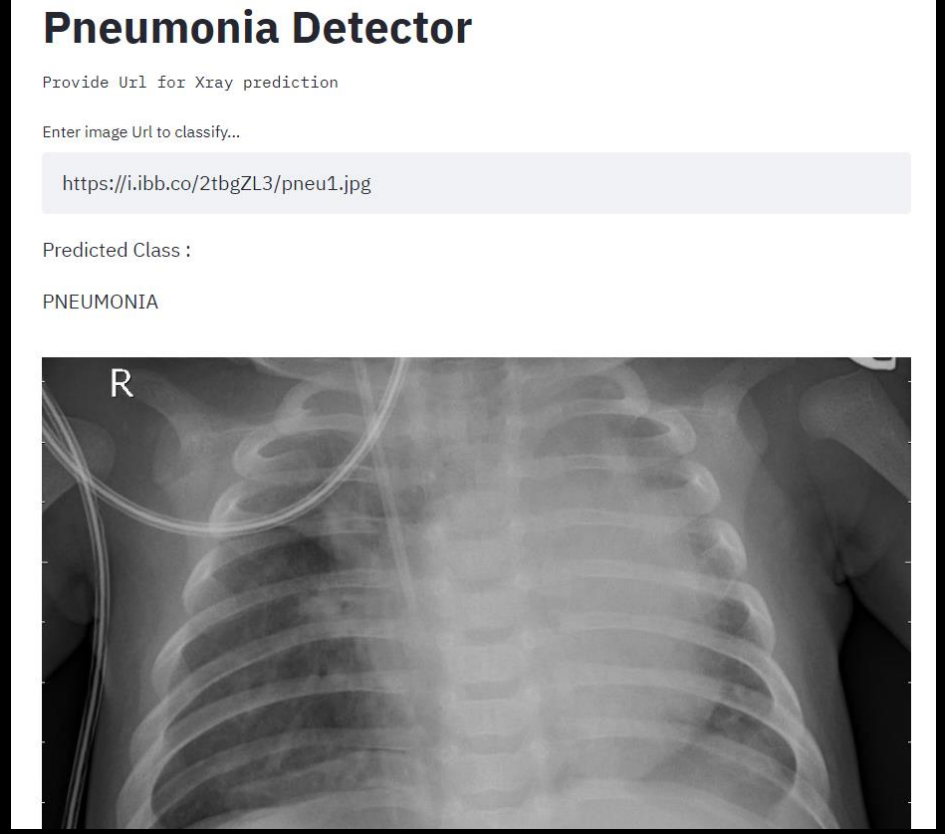
Faster result help reduce important time for patient's health

Accuracy

It has accuracy over 90 % which is enough to get clinically approved

Cost Effective

Less cost means everybody can access it at minimal or no cost at all



Web-App

BASED ON EFFICIENTNETB0

DEPLOYED USING - STREAMLIT

Unique

Web app means no installation

First to Market

Detector is new to market and has huge potential and accuracy

Tested

Around 1000 images makes accuracy higher

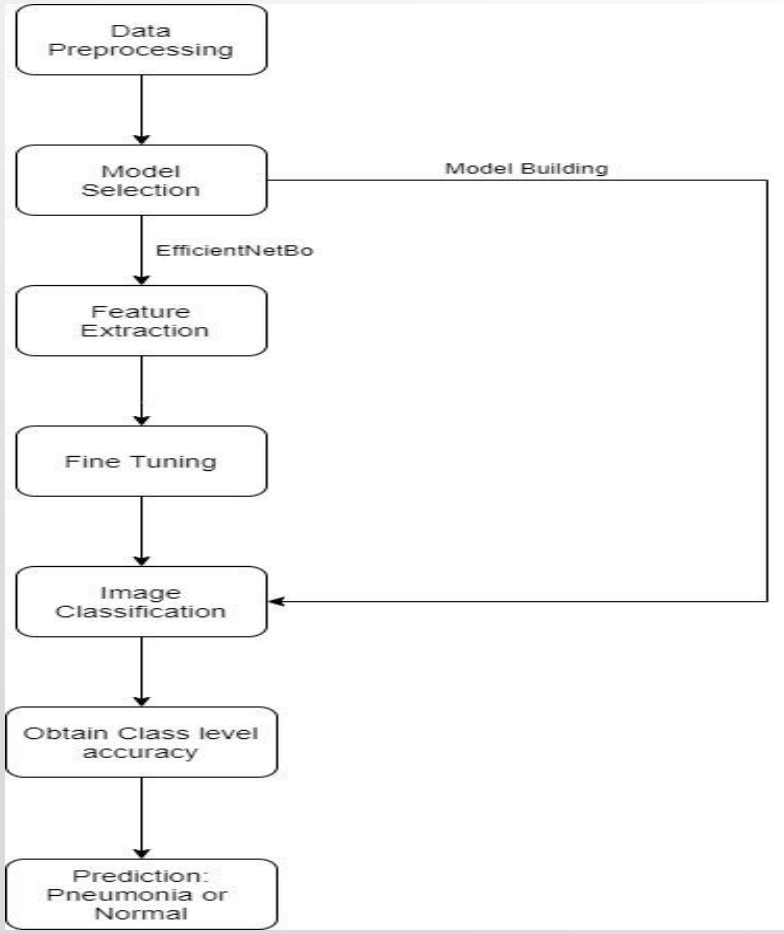
Authentic

Testing around some x rays showed 90 % accuracy

WORKING

FOR THIS MODEL WE HAVE BUILT OUR OWN MODELS AS WELL AS USED EFFICIENTNETB0

- High accuracy achieved by EfficientNetBO
- Scaling up with fine tuning to better suit the problem.
- Using softmax activation to get the prediction probabilities of each class.



Contoso

EfficientNet can be considered a group of convolutional neural network models.

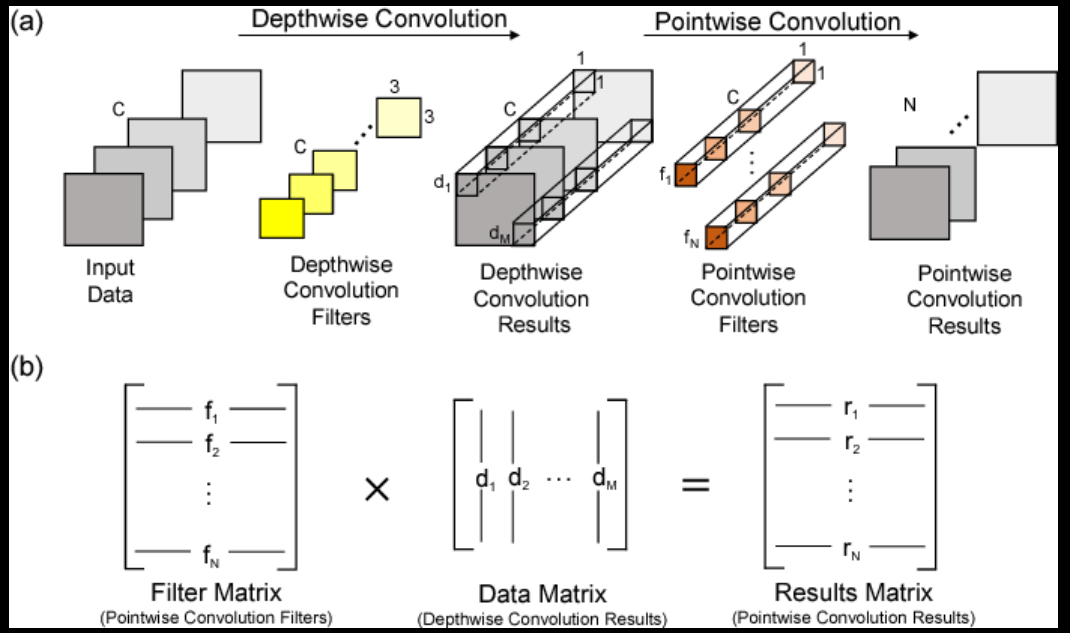
The EfficientNet model group consists of 8 models from B0 to B7, with each subsequent model number referring to variants with more parameters and higher accuracy.

Stage i	Operator $\hat{\mathcal{F}}_i$	Resolution $\hat{H}_i \times \hat{W}_i$	#Channels $\hat{C}_i$	#Layers $\hat{L}_i$
1	Conv3x3	224×224	32	1
2	MBConv1, k3x3	112×112	16	1
3	MBConv6, k3x3	112×112	24	2
4	MBConv6, k5x5	56×56	40	2
5	MBConv6, k3x3	28×28	80	3
6	MBConv6, k5x5	14×14	112	3
7	MBConv6, k5x5	14×14	192	4
8	MBConv6, k3x3	7×7	320	1
9	Conv1x1 & Pooling & FC	7×7	1280	1

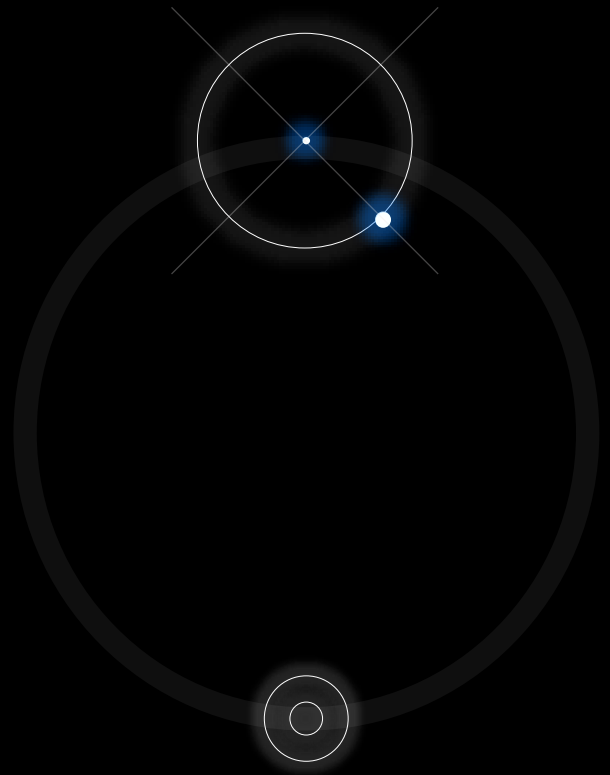
•**Depthwise Convolution + Pointwise Convolution:** Divides the original convolution into two stages to significantly reduce the cost of calculation, with a minimum loss of accuracy.

•**Inverse Res:** The original ResNet blocks consist of a layer that squeezes the channels, then a layer that extends the channels. In this way, it links skip connections to rich channel layers. In MBConv, however, blocks consist of a layer that first extends channels and then compresses them, so that layers with fewer channels are skip connected.

•**Linear bottleneck:** Uses linear activation in the last layer in each block to prevent loss of information from ReLU.



The main building block for EfficientNet is **MBConv**, an inverted bottleneck conv, originally known as MobileNetV2. Using shortcuts between bottlenecks by connecting a much smaller number of channels (compared to expansion layers), it was combined with an in-depth separable convolution, which reduced the calculation by almost k^2 compared to traditional layers. Where k denotes the kernel size, it specifies the height and width of the 2-dimensional convolution window.



INSIGHTS

PNEUMONIA-XRAY-ML-MODEL

Business Model

Although this model is created for social impact with no interest in making money, for it to be deployed in mass scale would need some external help and hence elaborating on its business model.

Research

A High accuracy is already achieved but still a bit of more research and it would be perfect

Finance

Requires almost no money except the internet access or very little when deployed globaly

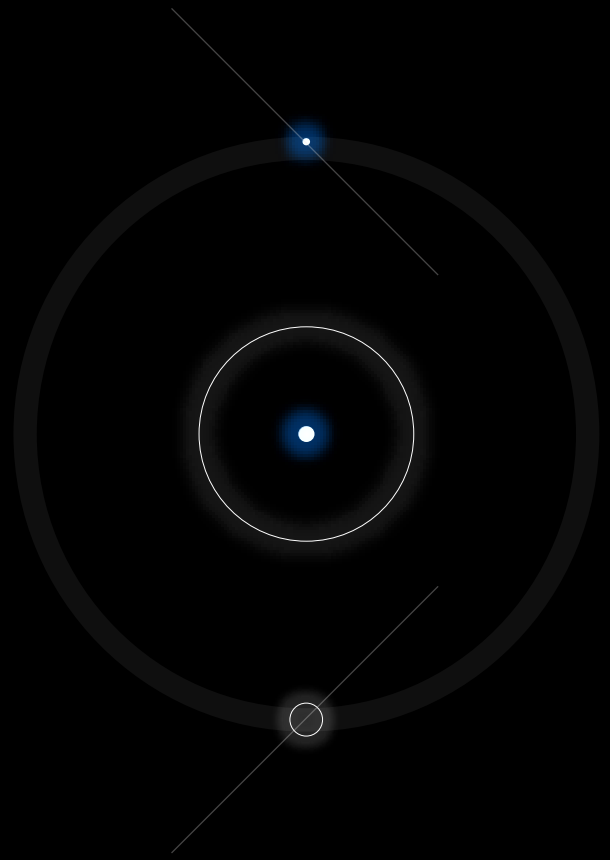
Invest

Requires a very less investment than any other high maintenance devices

RESOURCES

The resources which we accessed all throughout this project were all open-sourced.

- The data for the chest Xrays for this project was provided by Mendeley.com
- **Citation :** Kermany, Daniel; Zhang, Kang; Goldbaum, Michael (2018), “Labeled Optical Coherence Tomography (OCT) and Chest X-Ray Images for Classification”, Mendeley Data, V2, doi: 10.17632/rscbjbr9sj.2



THANK YOU

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https://share.streamlit.io/hrushi11/pneumonia_x-ray_ml_model/main/app.py