Radiology Assistant

INSTRUCTOR: Dr. Christopher Asakiewicz
AMIT KUMAR | JAYESH MEHTA | YASH WANVE

STEVENS INSTITUTE of TECHNOLOGY
THE INNOVATION UNIVERSITY®

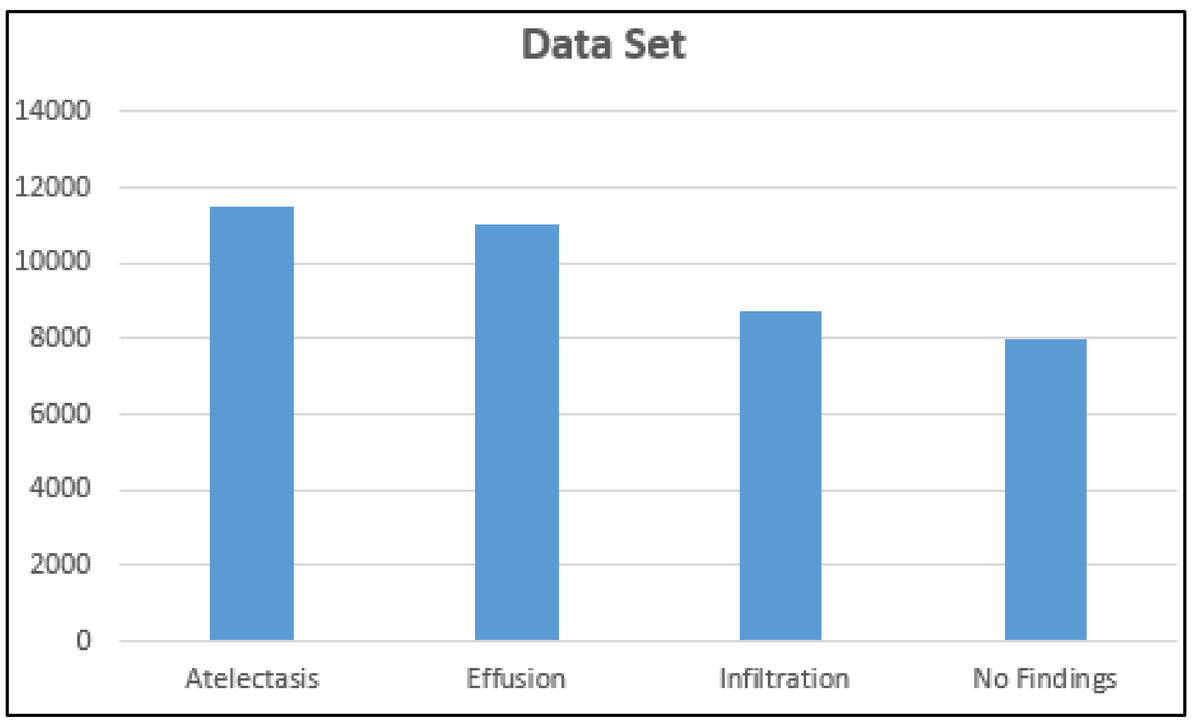
OBJECTIVE: To create a model that recognizes different x-ray types by exposing them through an input device.

INTRODUCTION:

Machine learning as a technology that has several implementations and the scope of growth is beyond current human comprehension. During our research to choose a topic we came across an idea in which we wanted to expose an X-ray copy to our model through an input device and it would give an output which would tell us whether the lungs are infected with a disease or not.

DATA:

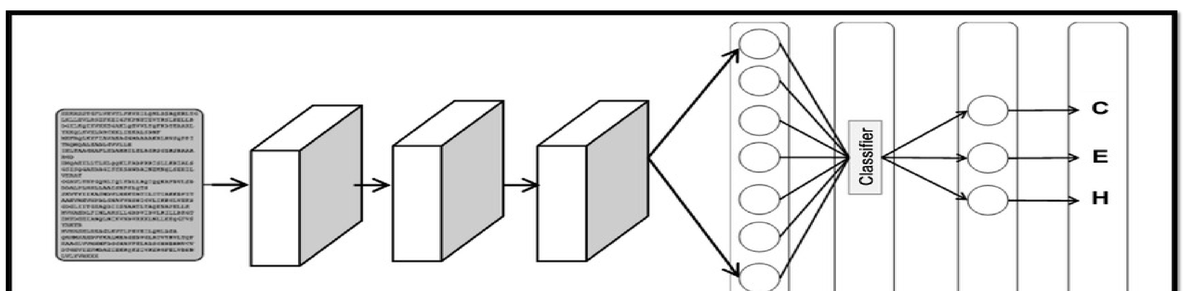
We derived our dataset online over which we implemented our neural network to develop the model. The dataset consists of multiple folders with x-rays of different diseases segregated accordingly.



MODELLING:

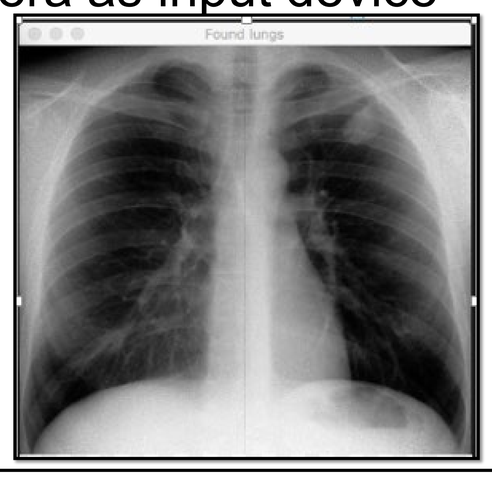
We have used Convoluted Neural Networks (CNN) for analyzing our input i.e. x-ray images.

The CNN architectures make the assumption that the inputs are images, which allows us to encode certain properties into the architecture. These then make the forward function more efficient to implement and vastly reduce the amount of parameters in the network.
We used 3 convolutional layers and 3 maxpooling layers of 2x2 size in our CNN.
Our model experiences a log loss of 0.8 .



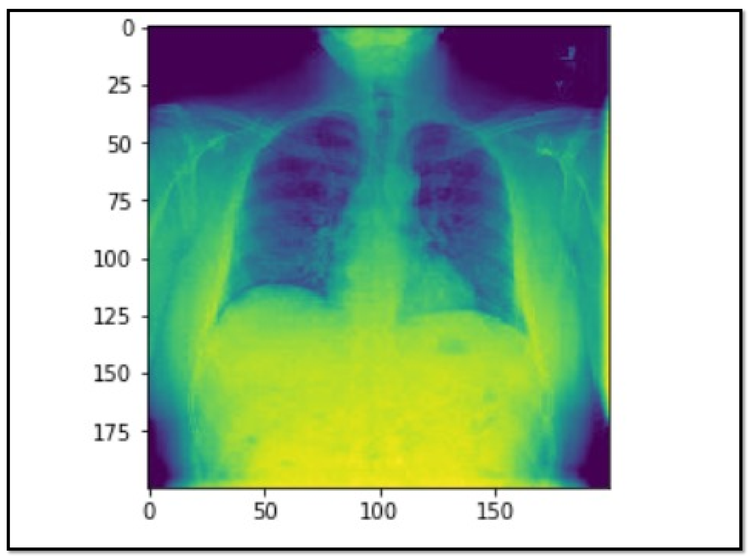
OPENCV:

We have utilized OpenCV library for computer vision. We have used a camera as input device through which the x-ray images are fed.

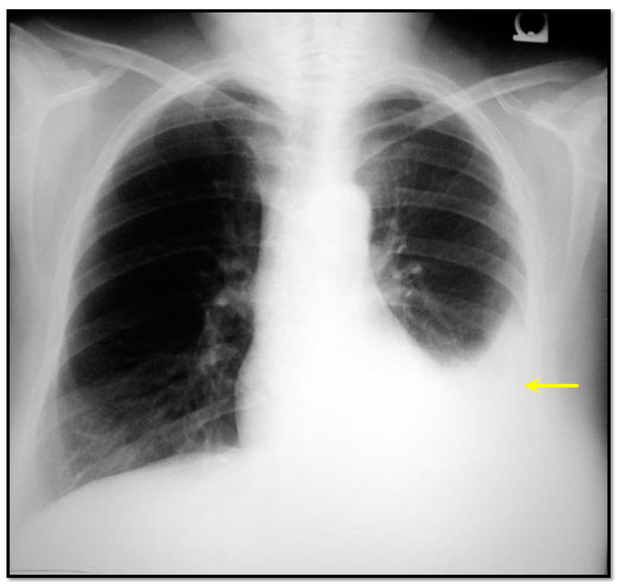


RESULTS:

After training our model on the dataset we then fed a sample x-ray from the input device and the program generates an output which tells us whether the set of lungs have contracted a disease or not and if yes, then which disease would it be.
The heatmap on the output image tells us about the probability of whether that area is infected or not. The green patches on the lower side of both the lungs show positive prediction of an infection.



We tested some random x-ray to test the model.
Example : This image shows the symptoms of effusion and when we tested it using our model we also got the same result.
[0,1,0,0]



CONCLUSION

CNNs compare images piece by piece. The pieces that it looks for are called features. By finding rough feature matches in roughly the same positions in two images, CNNs get a lot better at seeing