

JUNE 29, 2020

Pneumonia Diagnosis with Deep Learning

X-RAY IMAGE CLASSIFICATION





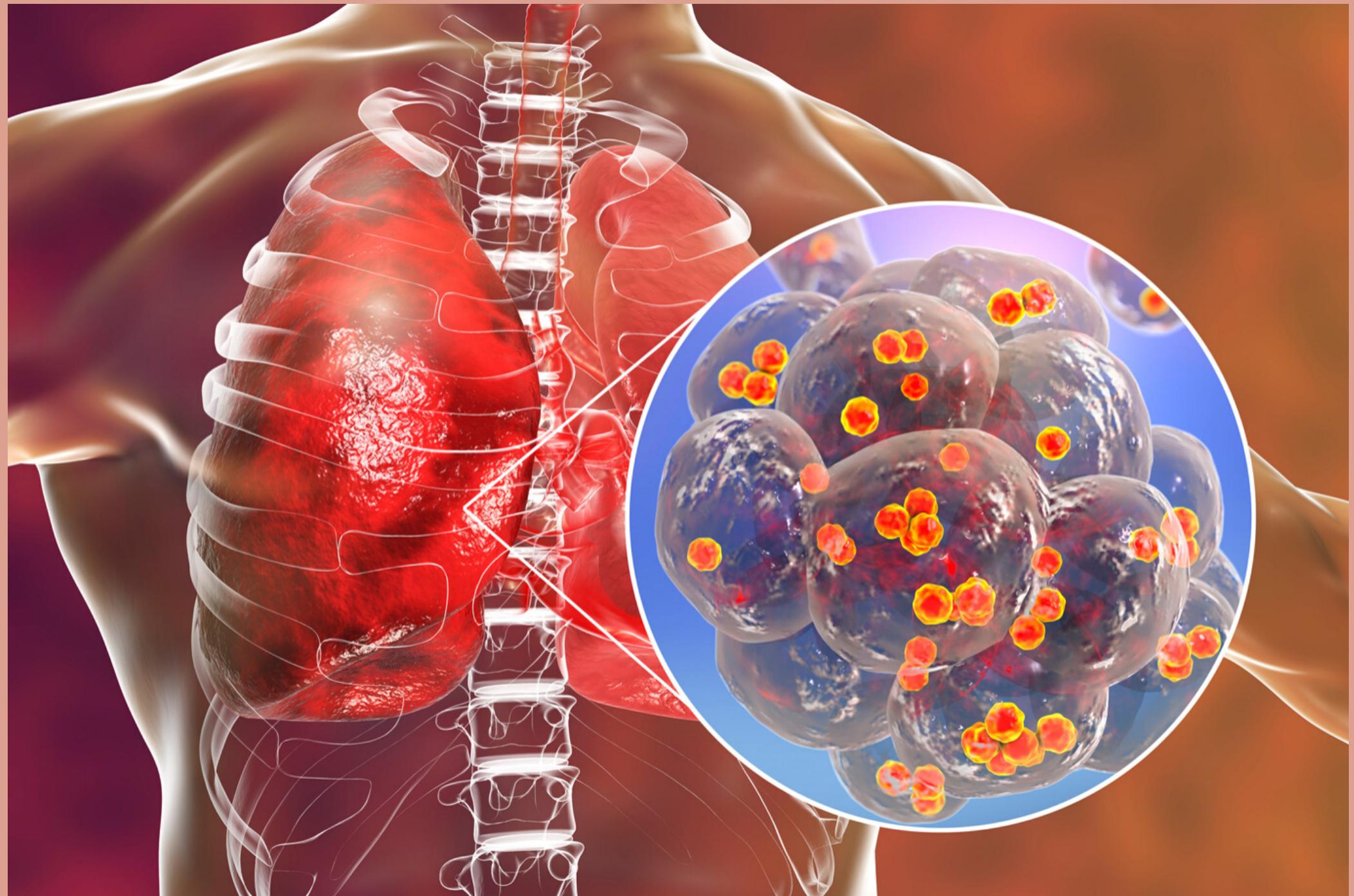
X-RAY DIAGNOSIS

COMPUTERS HELP DOCTORS

Disease diagnosis with radiology is a common practice in medicine but requires doctors to interpret the results from the x-ray images. Due to the increase in the number of patients and the low availability of doctors, there was a need for a new method to diagnose .

What is pneumonia?

INFECTION THAT
INFLAMES AIR SACS IN
ONE OR BOTH LUNGS,
WHICH MAY FILL WITH
FLUID.

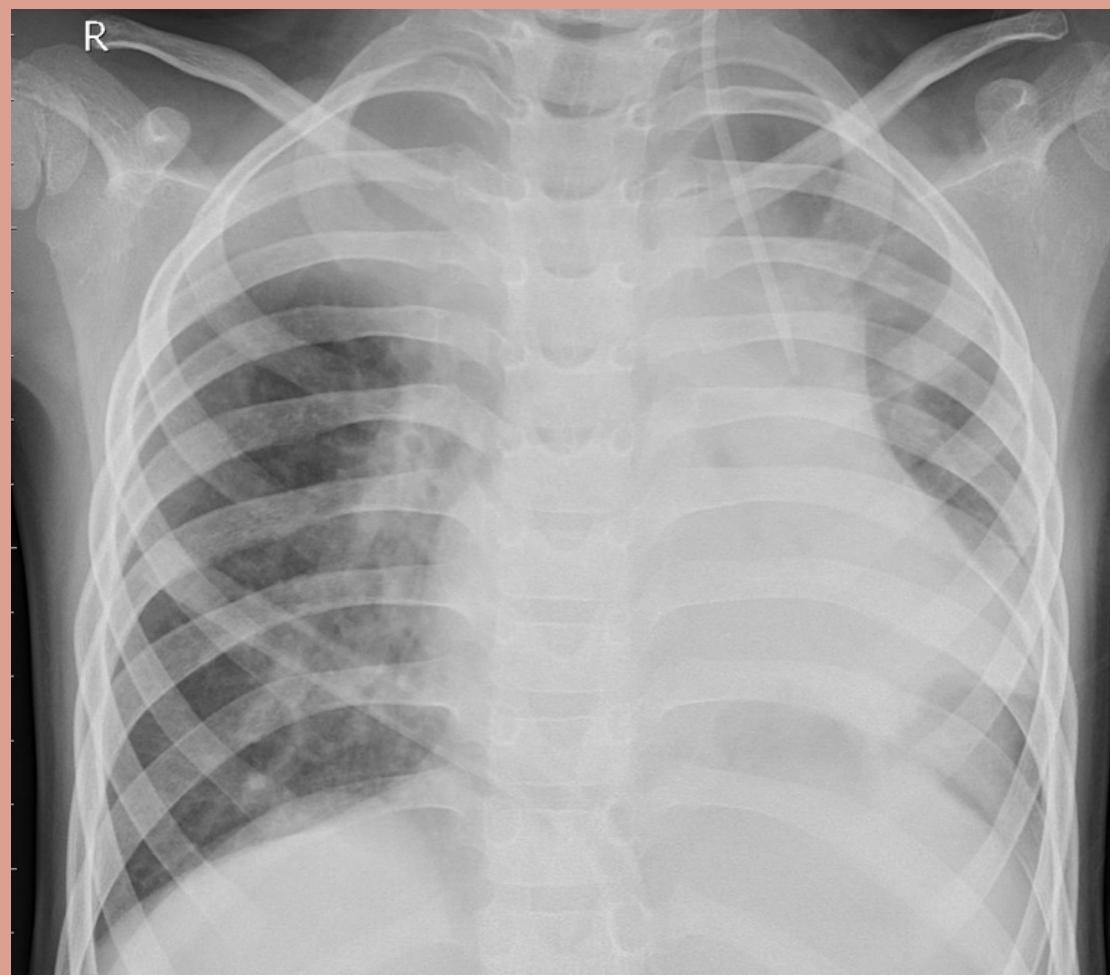


Lung X-rays

Normal



Bacteria



Virus



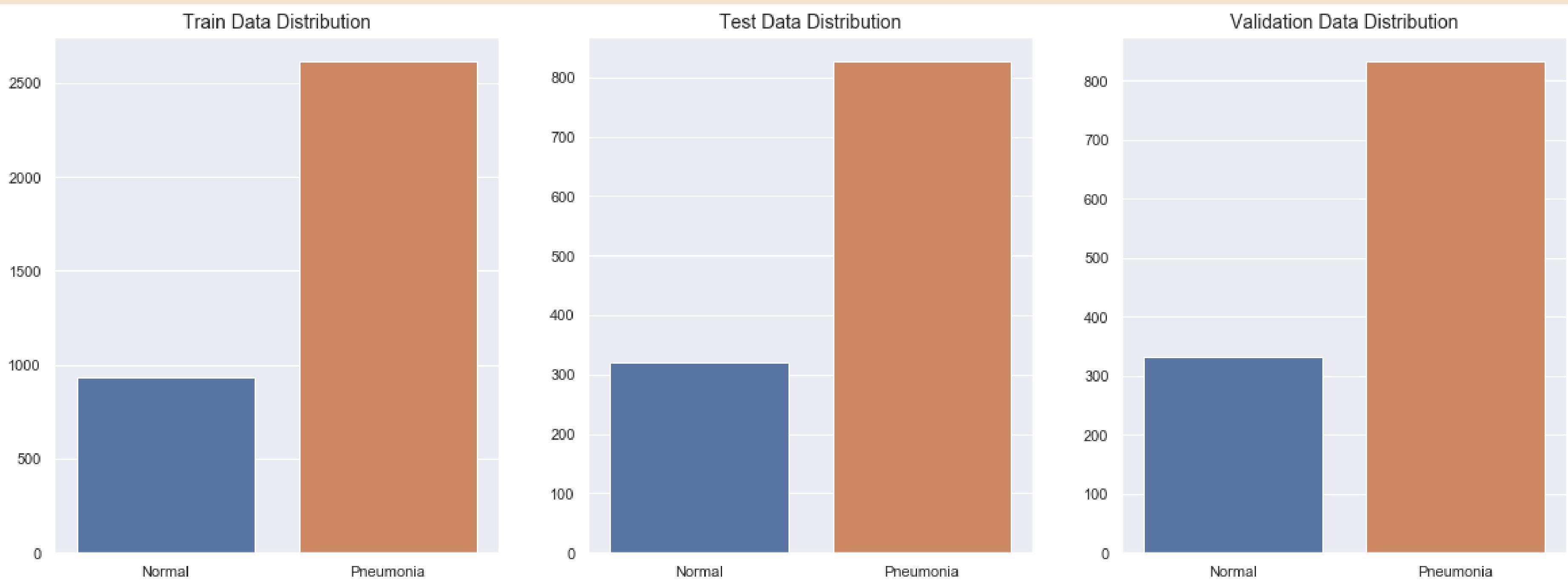
Chest X-ray images were selected from kids of one to five years old from Guangzhou Women and Children's Medical Center, Guangzhou, China.

Source:

<https://data.mendeley.com/datasets/rscbjbr9sj/3>



Train-Test-Validation Splits



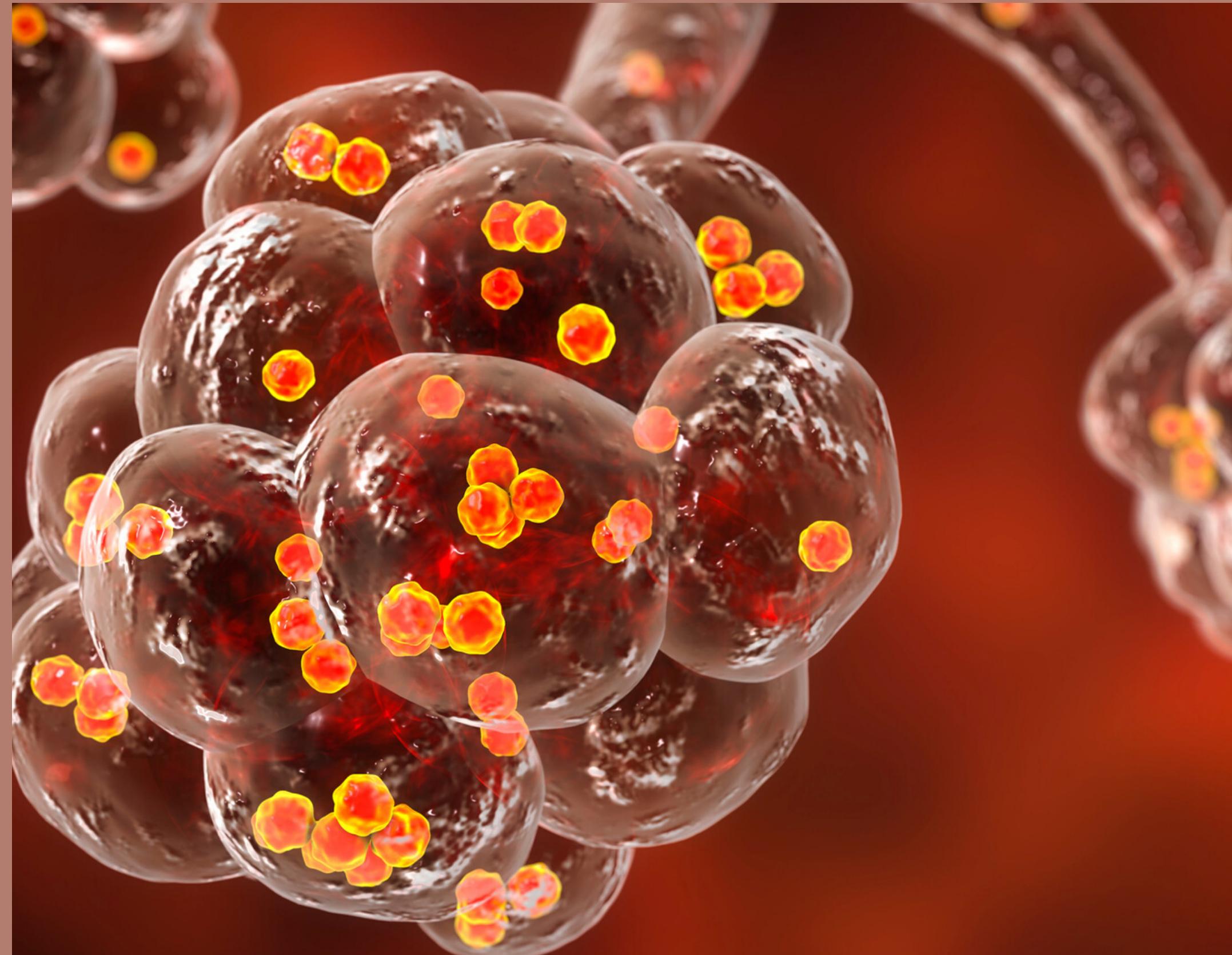
Methodology

We used the x-ray images data in our model. We detected the pneumonia affected parts of the lung using computer vision.

We had an accuracy of 95% by using pre-trained model.

WE CAN DETECT
PNEUMONIA AT
95% ACCURACY.

Our model was tested
over 1000 x-ray images.



Recommendations

Recommendation 1

Use computer based diagnosis system for an early diagnosis. A system attached to the X-ray machine can tell if the patient has pneumonia or not.



Recommendation 1

Day-1



No significant findings.
Lungs clear.

Day-4



Patchy, ill-defined
bilateral alveolar
consolidations, with a
peripheral distribution.

Day-5



Radiological worsening,
with consolidation in
the left upper lobe.

Day-7



Radiological worsening,
with typical findings of
ARDS.

Recommendation 2

Use this system
through internet
for pneumonia
diagnosis in
underdeveloped
countries.



Recommendation 3

Use this diagnosis system to decrease the workload in healthcare.

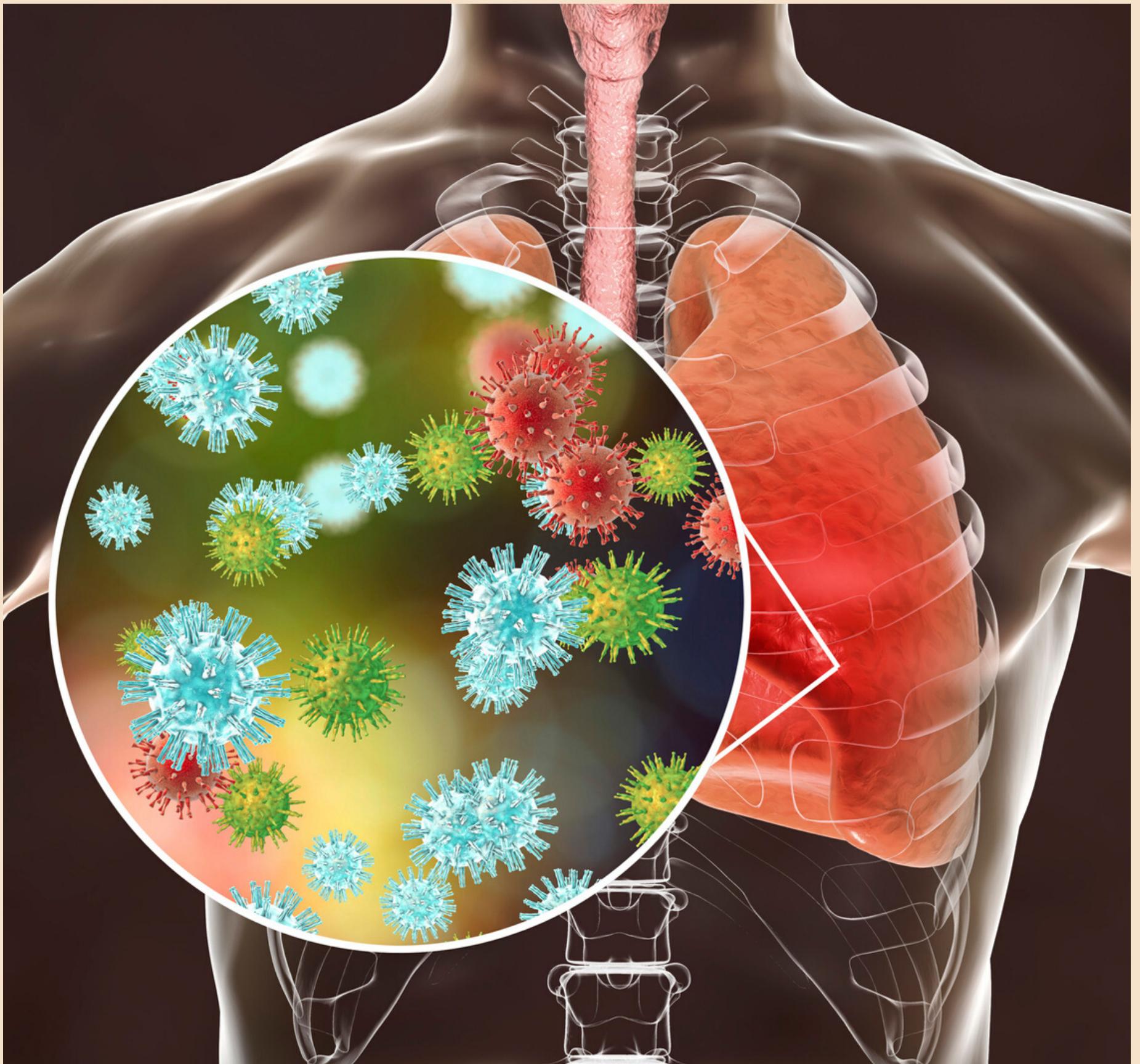


Future work

VIRAL OR BACTERIAL

Identify viral or bacterial pneumonia from x-ray images.

We can run the best model with 95% accuracy on only pneumonia images.



FAST AI AND PYTORCH

Apply the same models using
fast artificial intelligence(FastAI)
and Pytorch

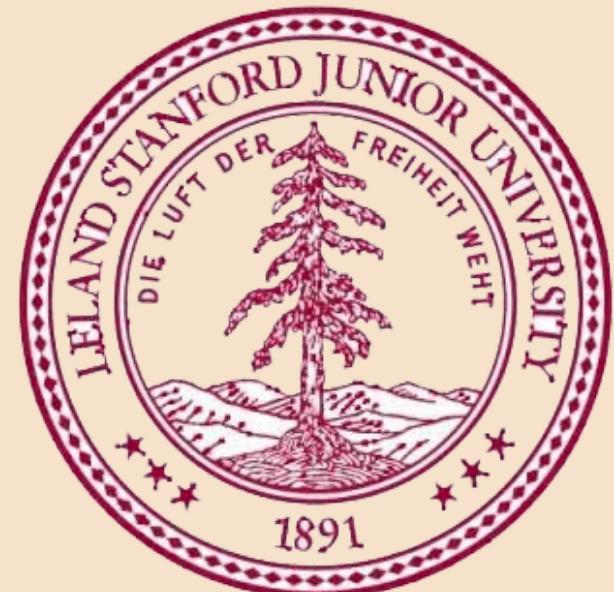


PyTorch

fast.ai

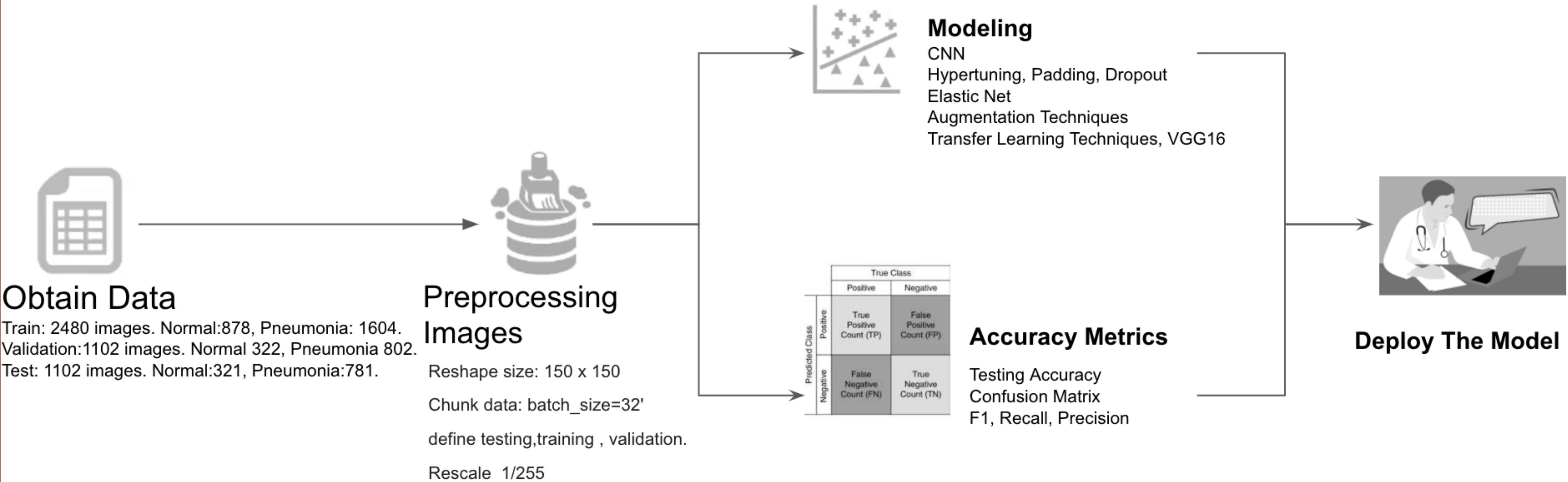
STANFORD
UNIVERSITY MODEL
CheXnet

STANFORD
UNIVERSITY



Appendix

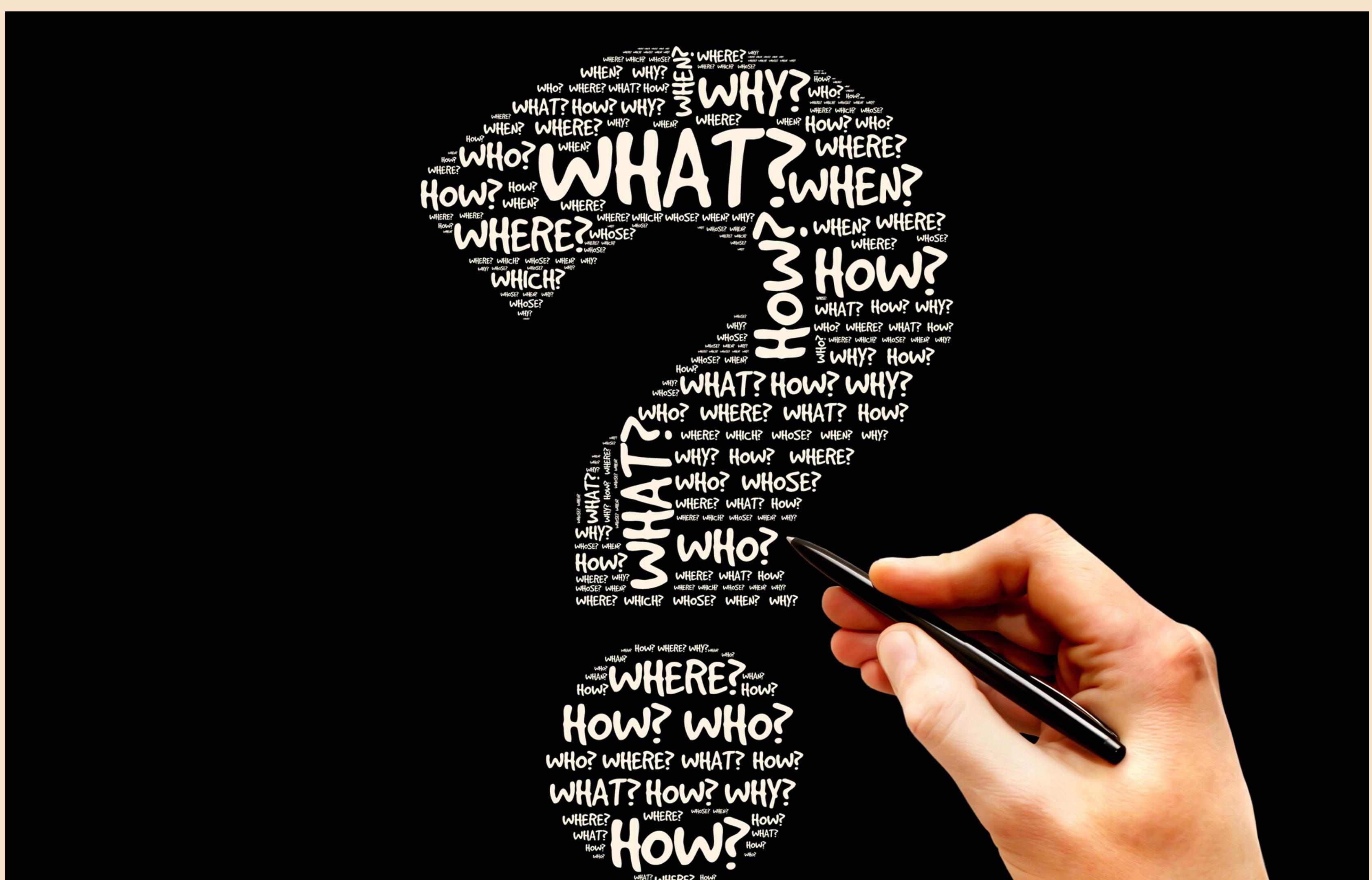
Methodology



Accuracies of all the models

	Model	Train Accuracy	Validation Accuracy	Test Accuracy
0	Base Model(with 4 conv,pooling layers, and dens...)	0.9983	0.9793	0.8841
1	Hyperparameter tuned model(padding, adam)	1.0000	0.9759	0.8728
2	Regularized Model(Dropout, Ridge-Lasso)	0.7378	0.7160	0.7204
3	Augmented Model	0.9314	0.7160	0.7204
4	Transfer Learning Model(VGG16)	0.9881	0.9733	0.9486

Questions



t h a n k y o u