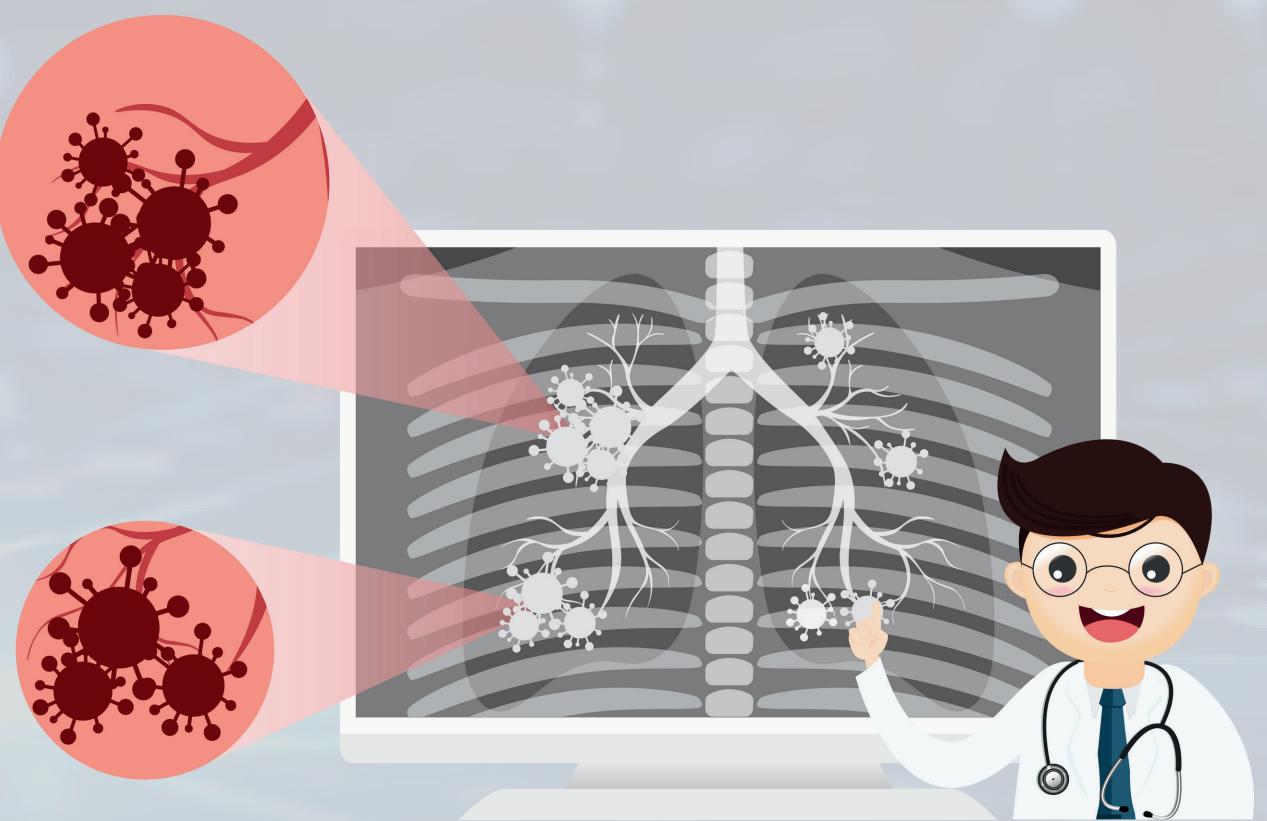


PNEUMONIA DETECTION THROUGH AI

BY SIDDHANT PATEL , AARADHYA GUPTA
RAHUL SRIDHAR , ZEESHAN DHAKAAN &
SARTHAK KHAIRE

WHAT IS PNEUMONIA ??

Pneumonia is a lung infection where the air sacs (alveoli) become inflamed and fill with fluid or pus. It can be caused by bacteria, viruses , fungi, or aspiration of food or liquids.

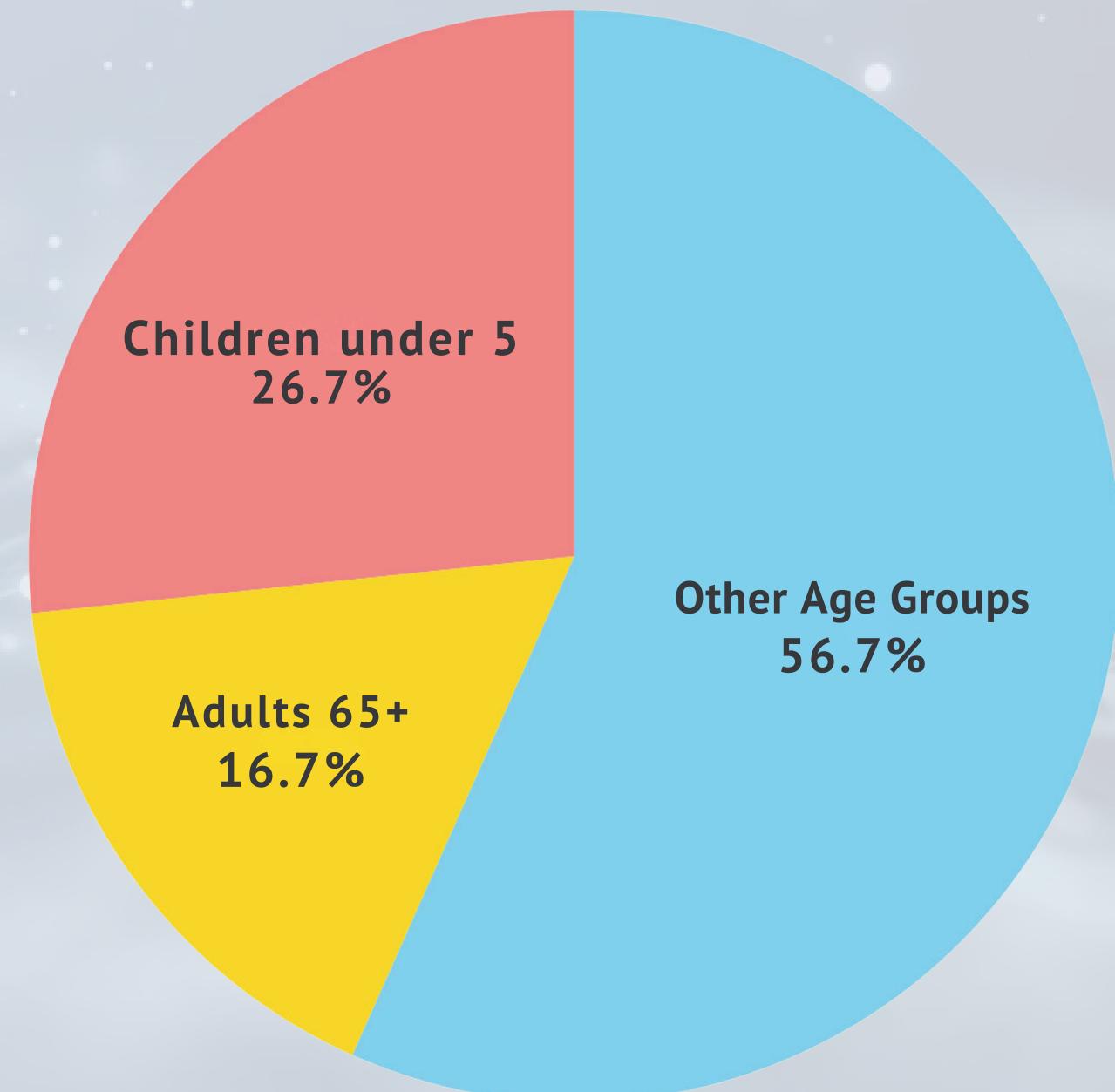


WHY IS THIS A PROBLEM??

REASON 1

- Each year, pneumonia affects an estimated 450 million people globally, causing approximately 2.5 million deaths.
- A significant portion of these deaths occurs in children under five and the elderly.

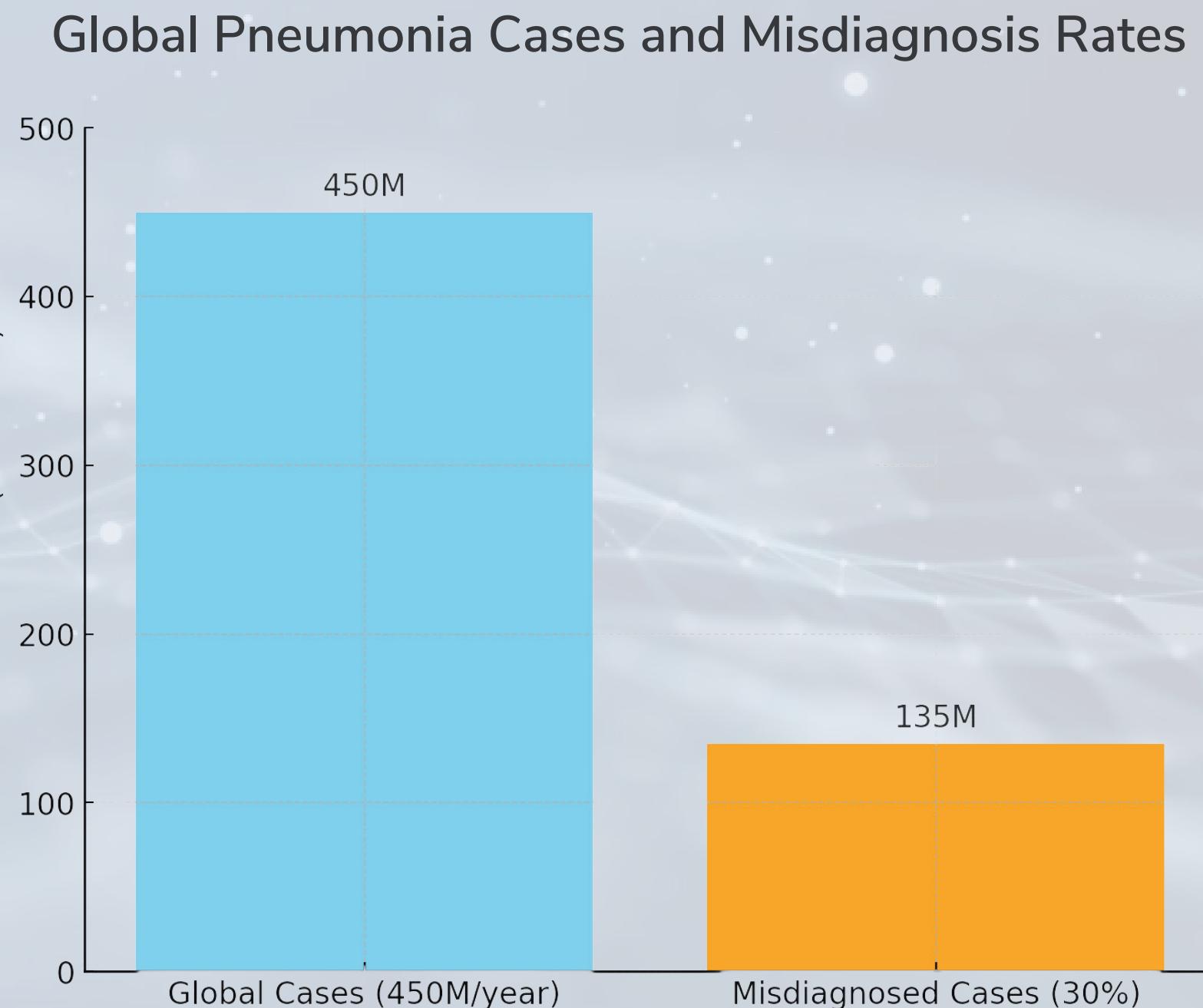
Annual Global Pneumonia Cases by Age Group



WHY IS THIS A PROBLEM??

REASON 2

- Up to 30% of pneumonia cases are misdiagnosed, especially in areas lacking advanced tools like chest X-rays, causing underdiagnosis or overtreatment.
- This emphasizes the need for accurate methods, such as AI-based chest X-ray diagnostics.

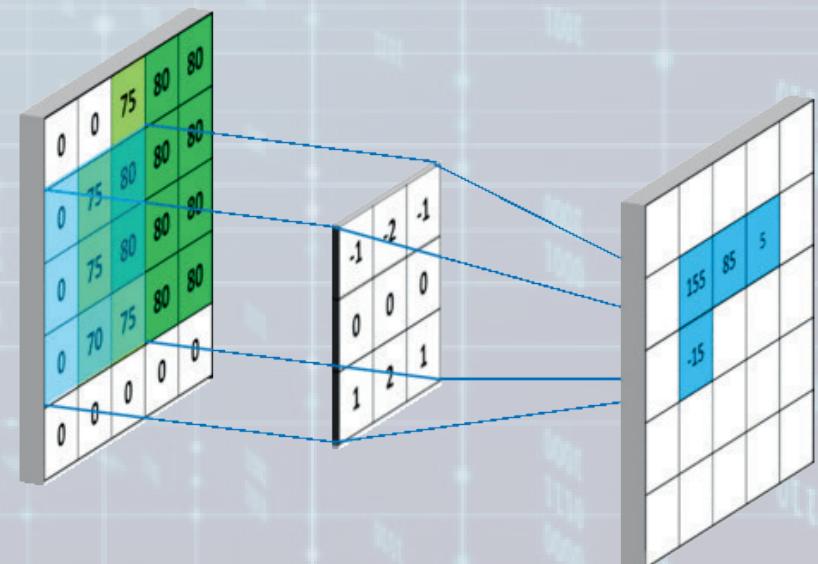


RESEARCH TOPIC

Prediction of Pneumonia by chest
X-ray scans using CNN

WHAT IS CNN??

A Convolutional Neural Network (CNN) is a computer program that looks at pictures in layers, like peeling an onion. It learns to see important parts, like shapes or colors, to figure out what the picture shows, like a cat or a dog.



Methodology

Data Collection

1

Data Preprocessing

2

Model Architecture

3

Model Training

4

Model Evaluation

5

Predictions

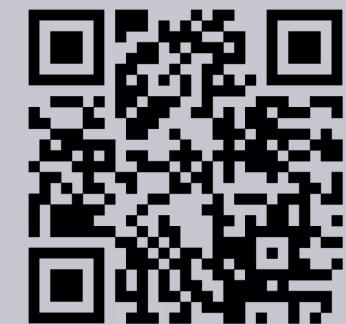
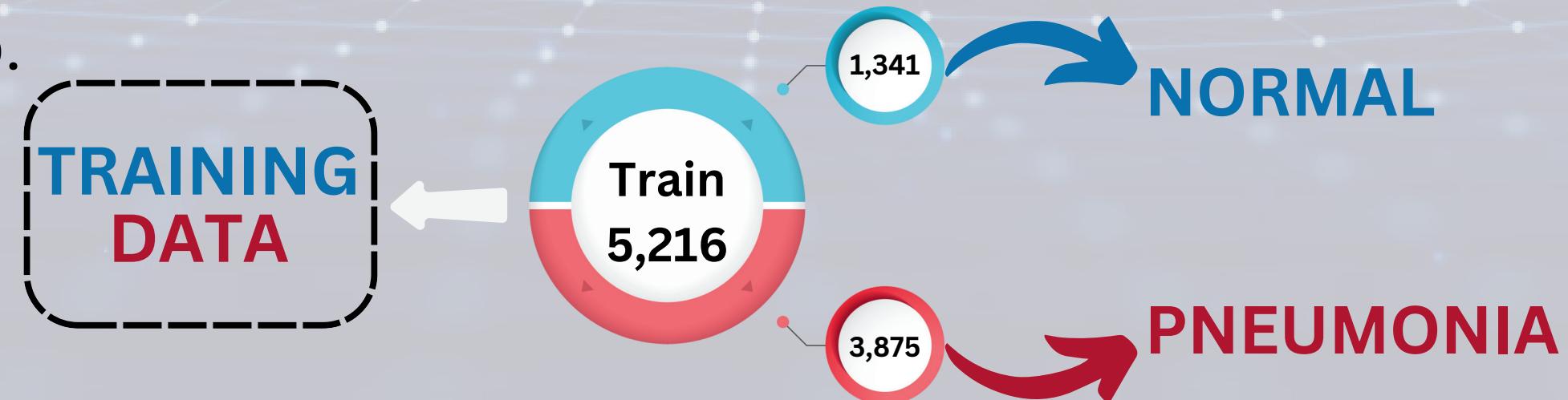
6

Data Collection

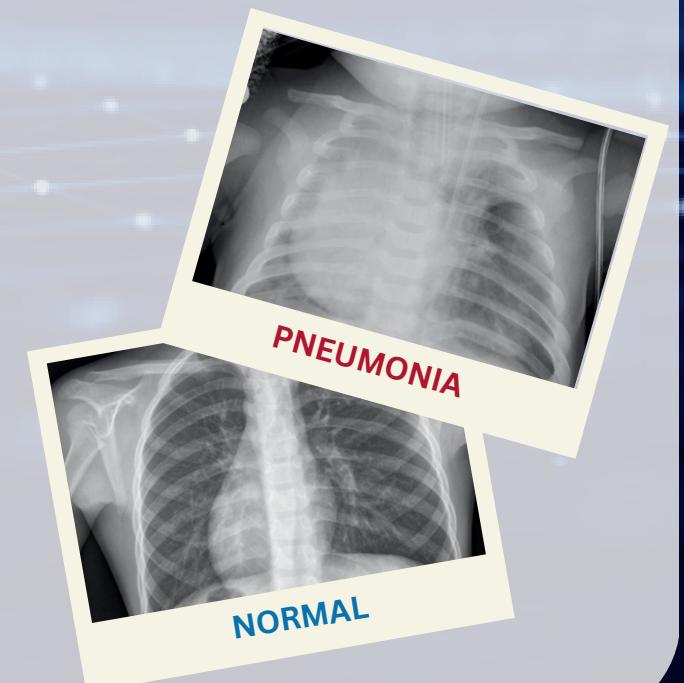
Chest X-ray images were collected from **Kaggle**, a platform where datasets are shared. The dataset we used included 5,863 images divided into two categories:

- Training Data (5,216 images)
- Testing Data (647 images)

These two data is further categorised into two more datasets, **Pneumonia-infected lungs** and **normal, healthy lungs**. This labeled dataset allowed us to train our AI to recognize the difference between the two.



KAGGLE DATASET



Data Processing

STAGE 1 : BALANCING

Since the dataset may have an unequal number of images in the "normal" and "pneumonia" categories, the larger category is downsampled to ensure balance, preventing bias in the model's learning process.



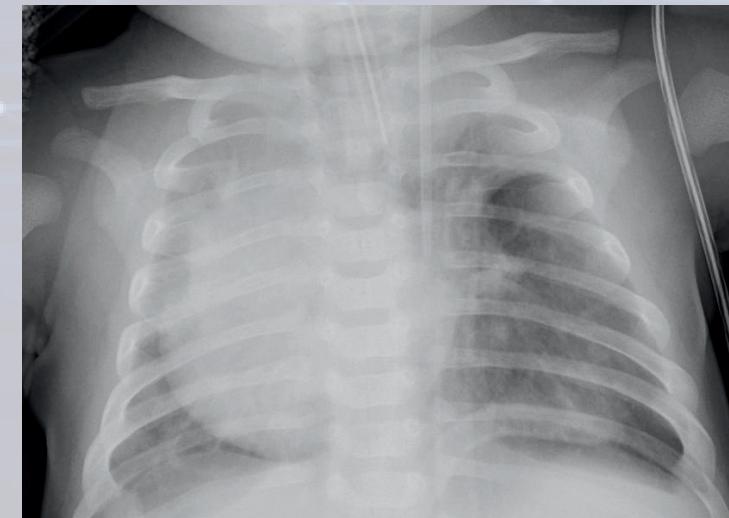
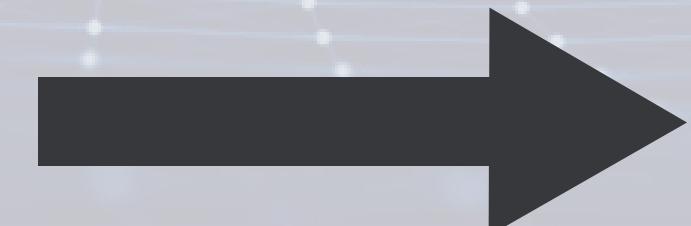
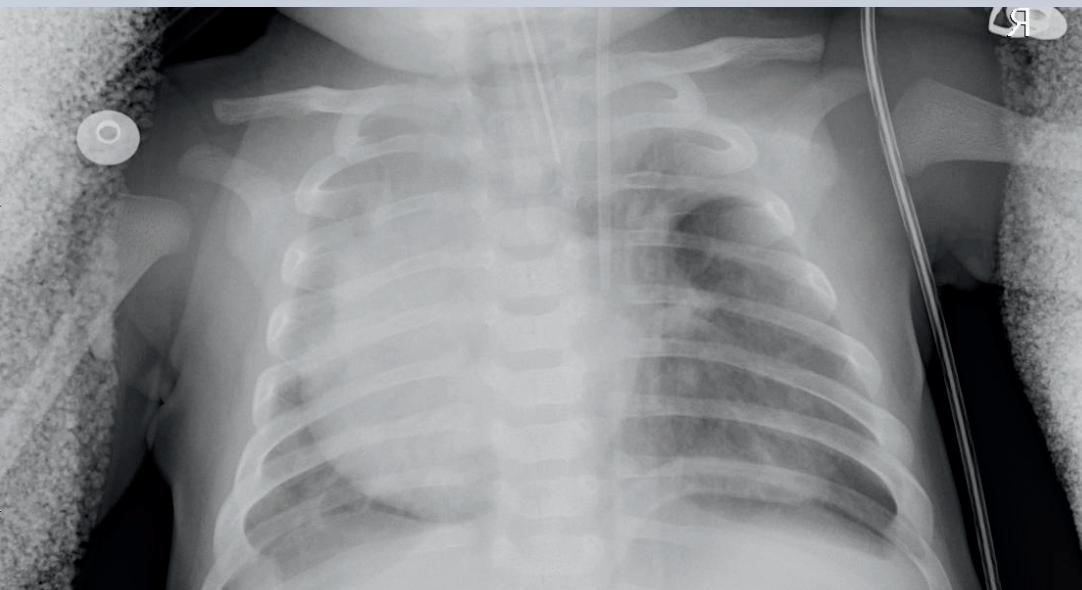
The dataset had more Pneumonia images than Normal ones, so the Pneumonia images were reduced to 1,341 to match the Normal images, ensuring balanced training.

Data Processing

STAGE 2 : NORMALIZING

This step involves preparing the image data for the AI model.

- **RESIZING :** Each image is resized to 64x64 pixels to make processing faster



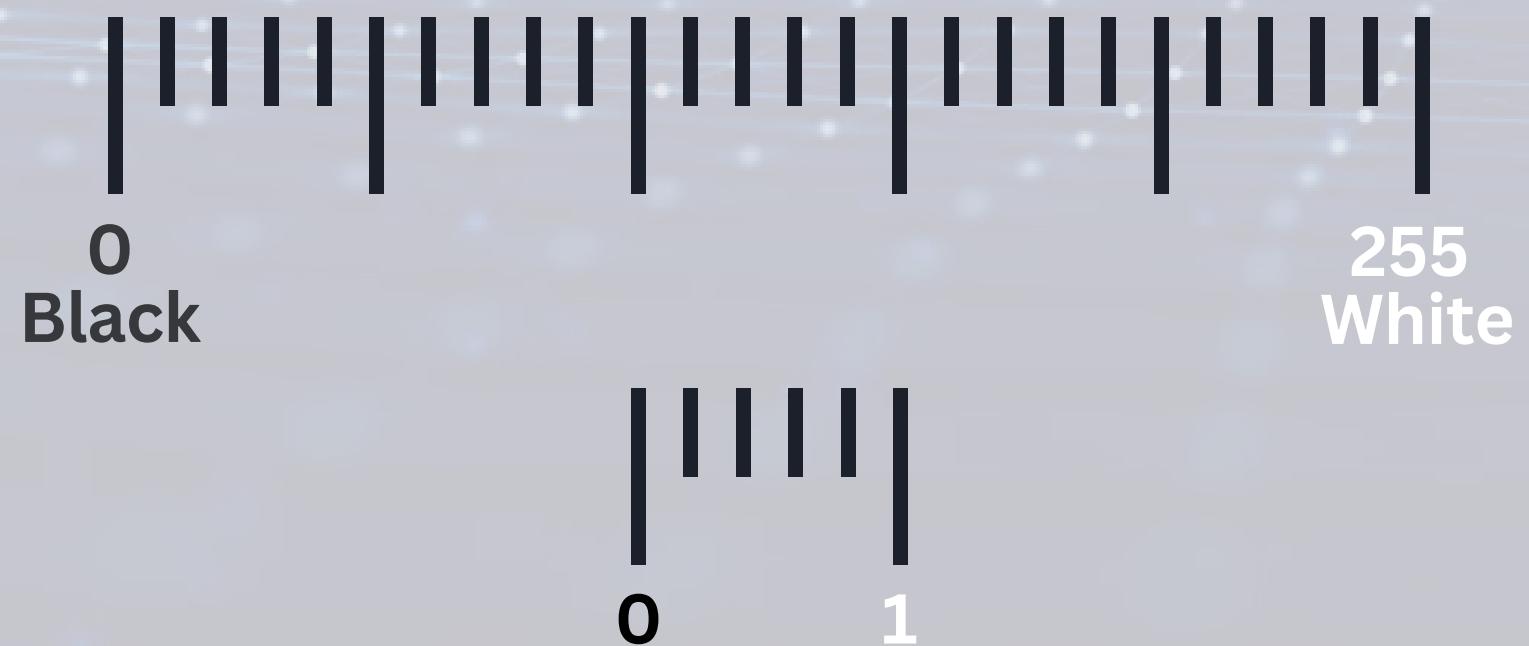
120 X 80

64 X 64

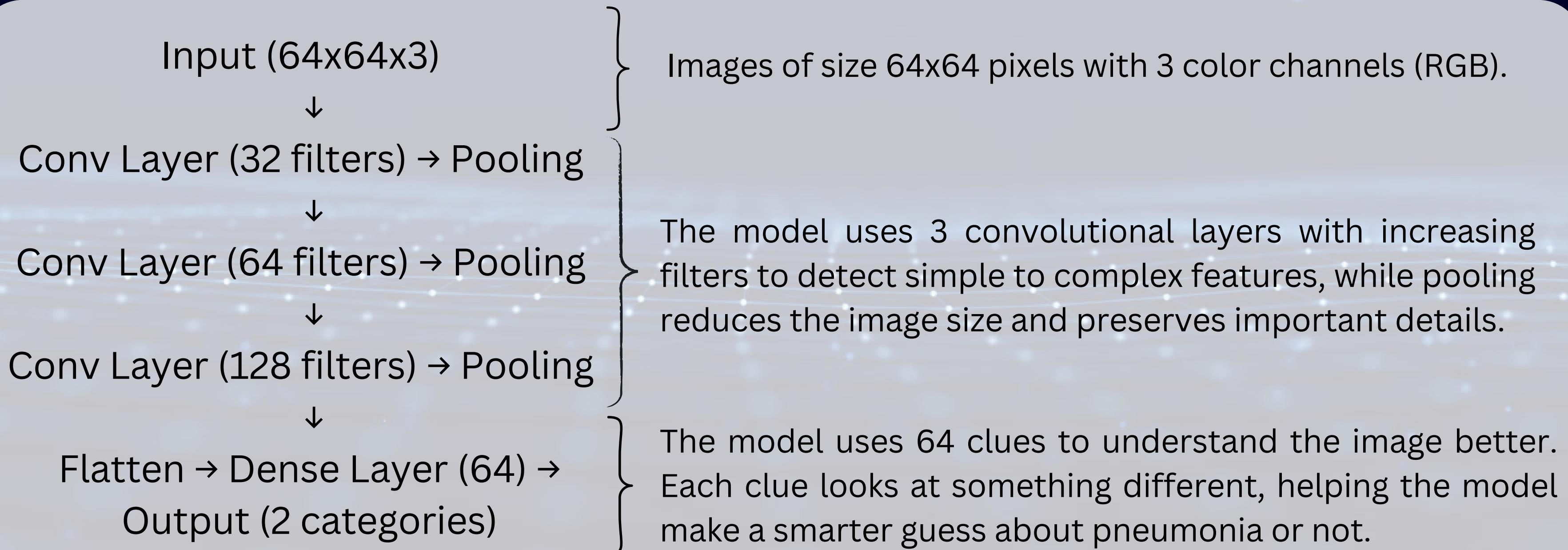
Data Processing

STAGE 2 : NORMALIZING

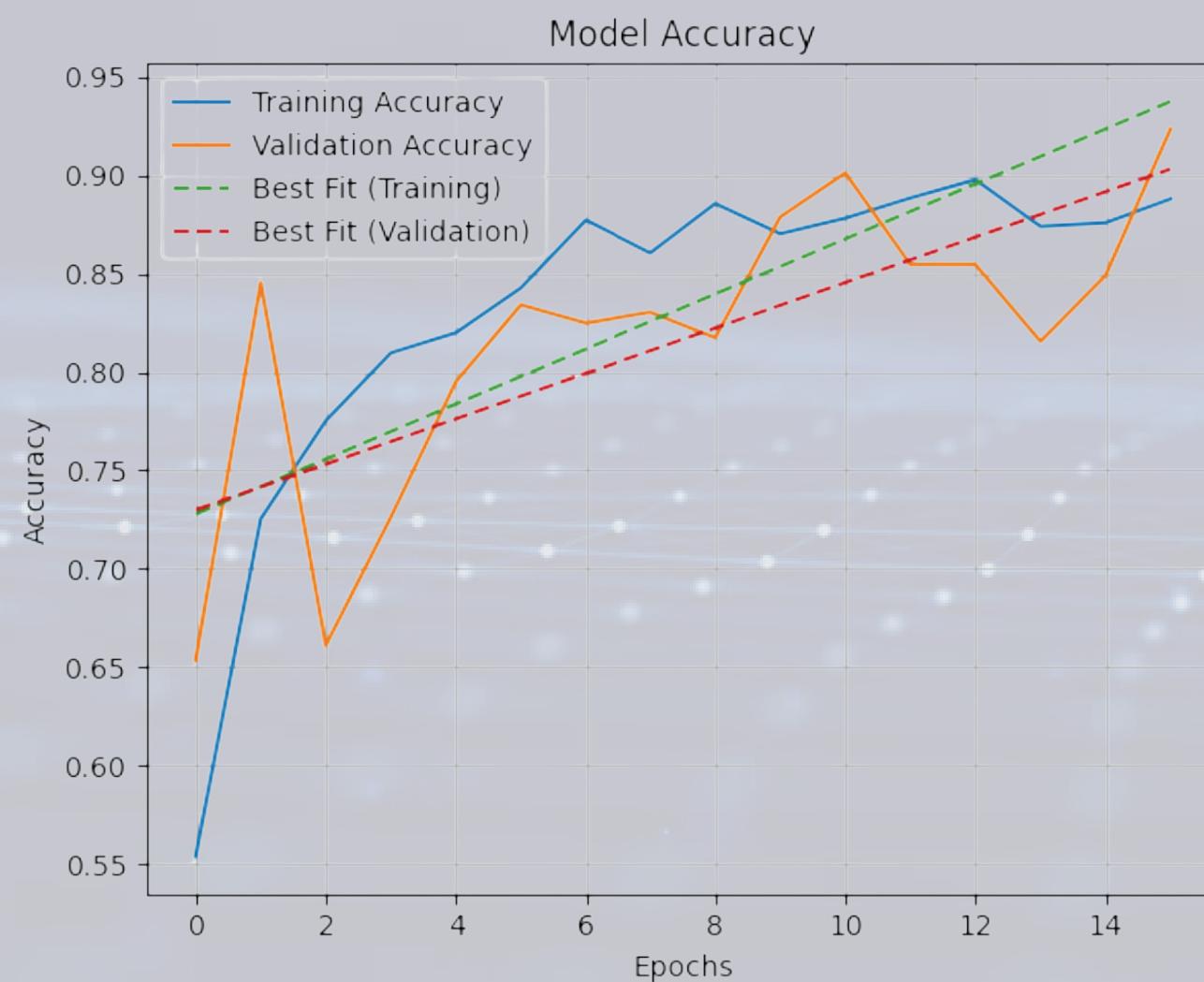
- **PIXELIZING:** Each image is normalized by dividing the pixel values by 255, so all inputs are on a similar scale. the pixel intensity scale shifts from 0-255 to 0-1, where 0 remains black, and 1 becomes white.



Model Architecture

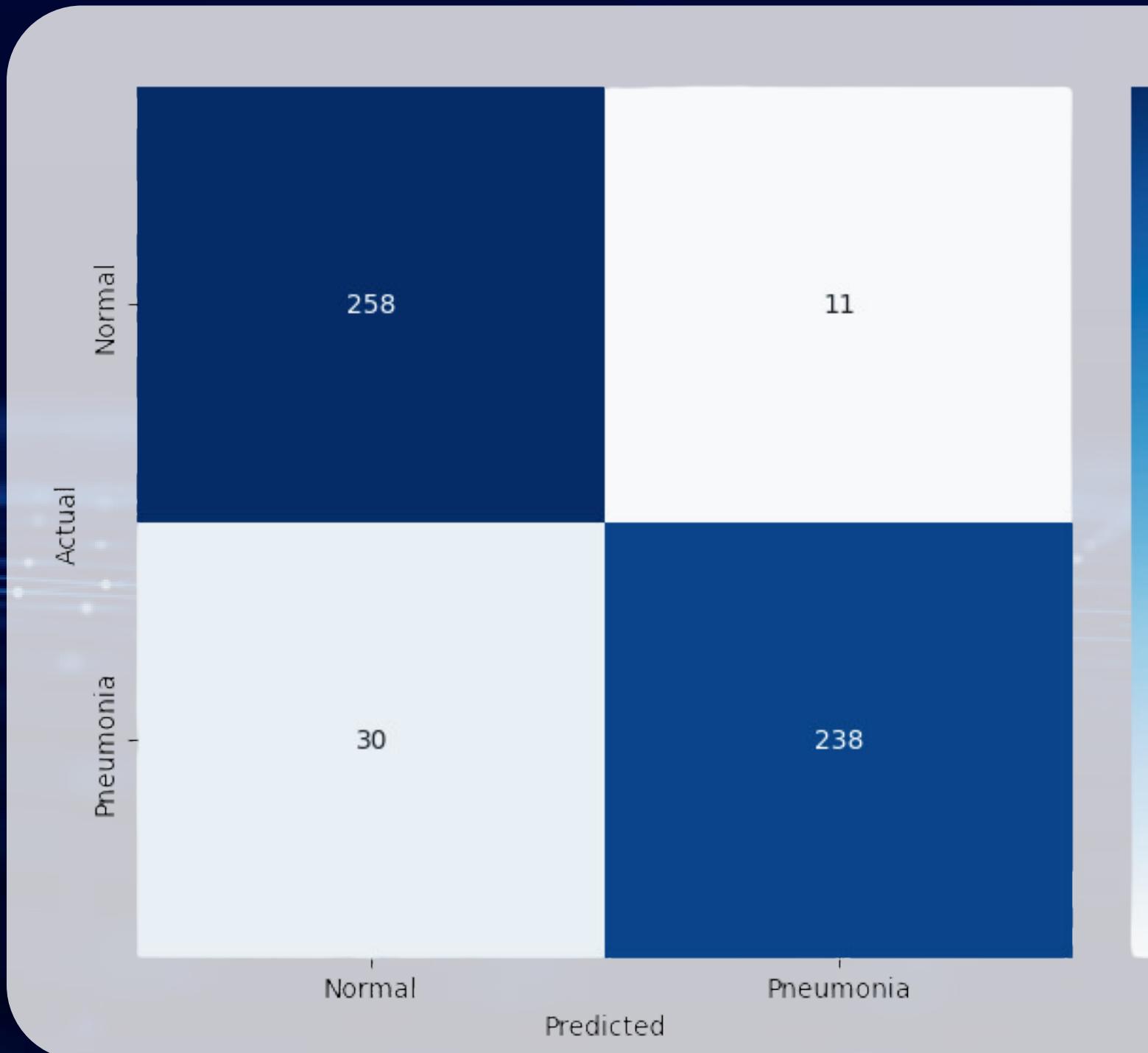


Model Training



We trained the model for 16 cycles (called epochs), where the model improved each time by adjusting its settings. To make sure the model didn't get too good at only recognizing the training data, we used early stopping, which helped prevent overfitting and made sure the model could work well on new data too.

Model Evaluation

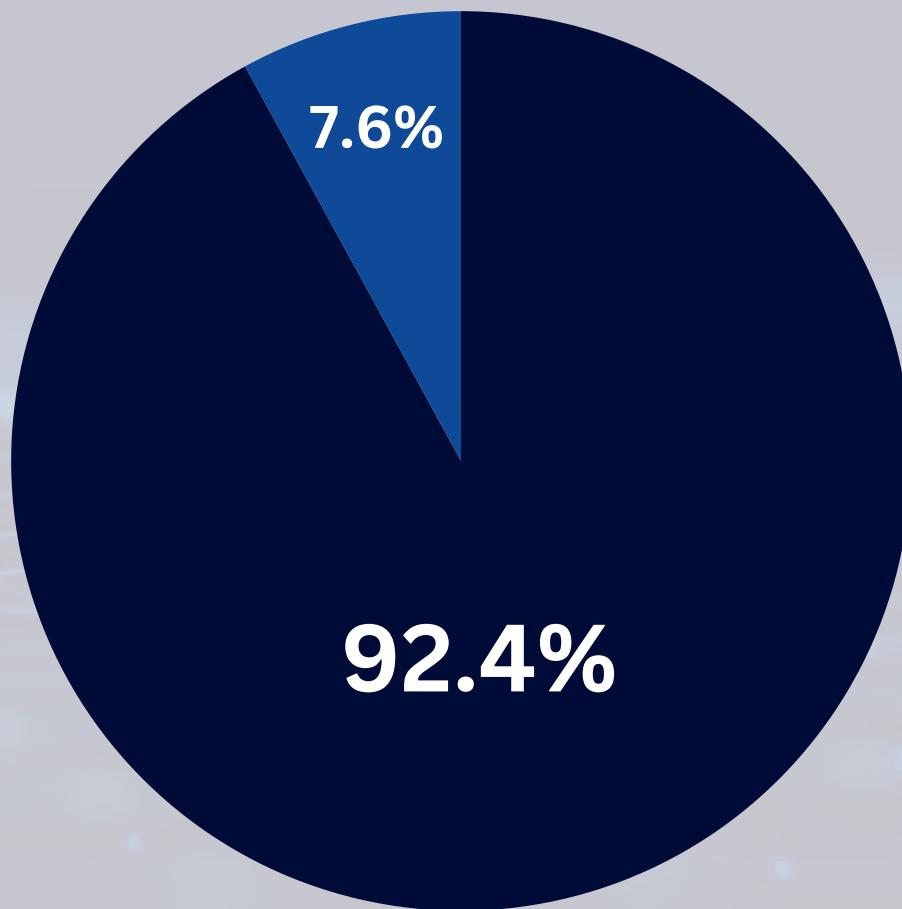


Confusion Matrix

The figure indicates the exact number of successes and errors the model has made during testing. The dark-blue blocks show the number of times the model has successfully given the correct diagnosis and the white blocks show the failures/wrong predictions.

Predictions

Our pneumonia detection model achieved a high accuracy of 92.4%, demonstrating its ability to correctly identify pneumonia in chest X-rays.



Conclusion

This model demonstrates impressive accuracy, significantly reducing the need for second opinions and minimizing the risk of misdiagnosis. However, further refinement is essential to lower the margin of error, ensuring its reliability for real-world applications. This underscores the transformative potential of AI in revolutionizing healthcare.

RESULTS

HOME PAGE

Pneumonia Detection App

Upload a lung X-ray image to classify it as Normal or Pneumonia. 'MADE BY SIDDHANT PATEL'

Upload X-ray Image

Drop Image Here
- or -
Click to Upload

Waiting for a lung X-ray Image...

Flag

Clear

Submit

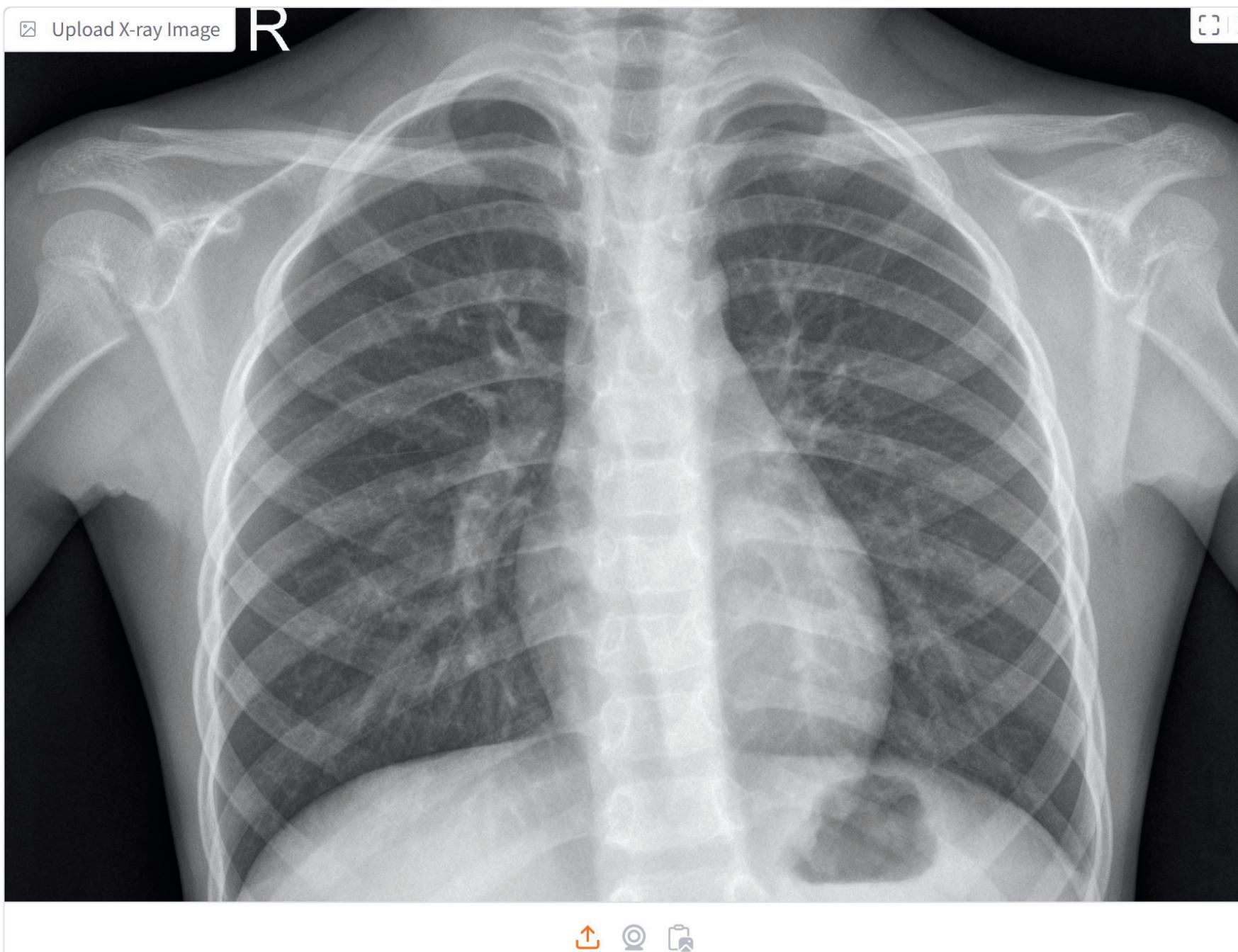
≡ Examples



DETECTED NORMAL

Pneumonia Detection App

Upload a lung X-ray image to classify it as Normal or Pneumonia. 'MADE BY SIDDHANT PATEL'



Normal - 97.0%

Flag

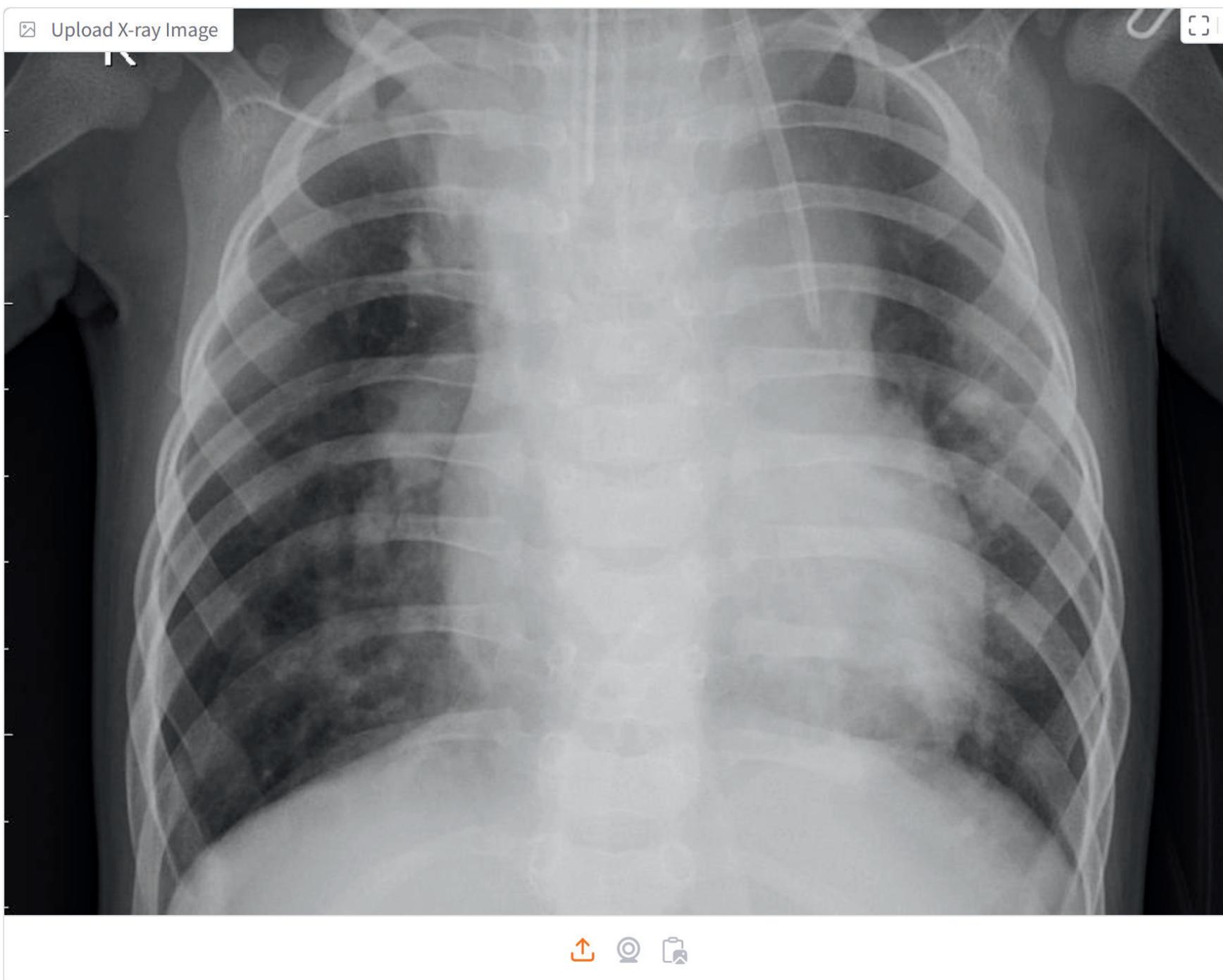
Clear

Submit

DETECTED PNEUMONIA

Pneumonia Detection App

Upload a lung X-ray image to classify it as Normal or Pneumonia. 'MADE BY SIDDHANT PATEL'



Pneumonia - 100.0%

Flag

Clear

Submit