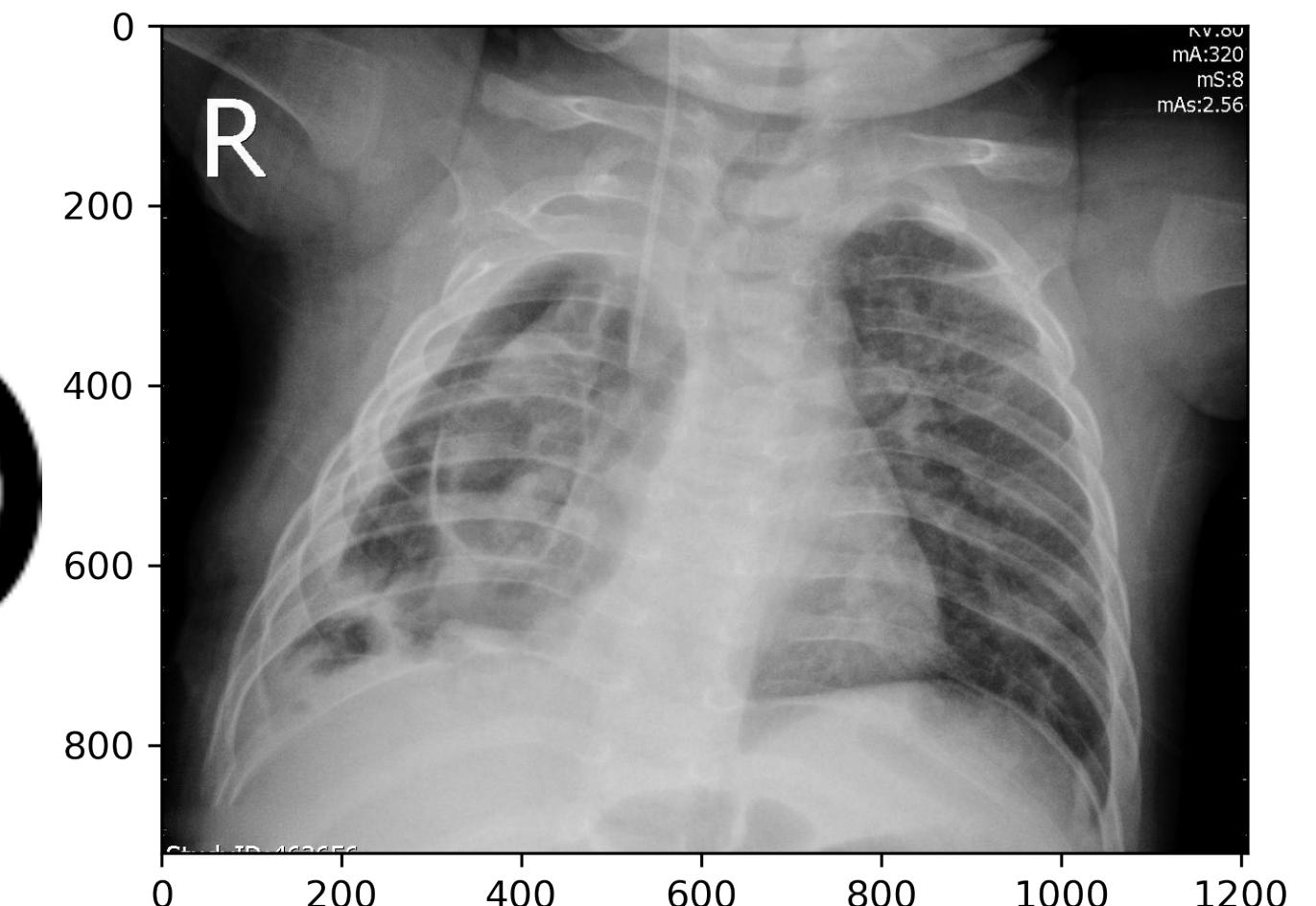
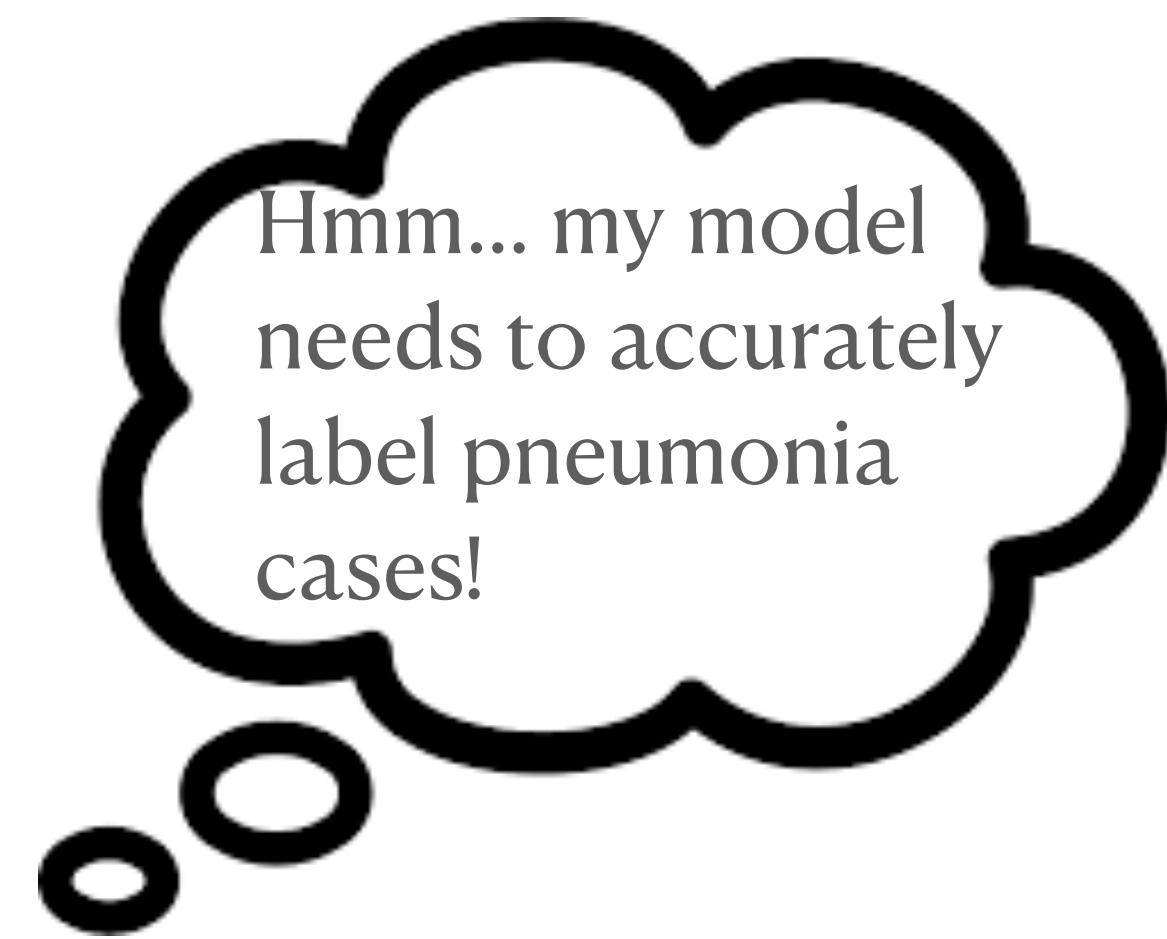


Image Classification using Neural Networks

**Deepali Sharma
April, 2023**

- Stakeholder:
 - Piedmont Healthcare Group
-  Piedmont
- Business Problem:
 - Label accurately the chest X-rays as belonging to **pneumonia** or **normal** class.



We need a data scientist who can make job easier for our radiologists!

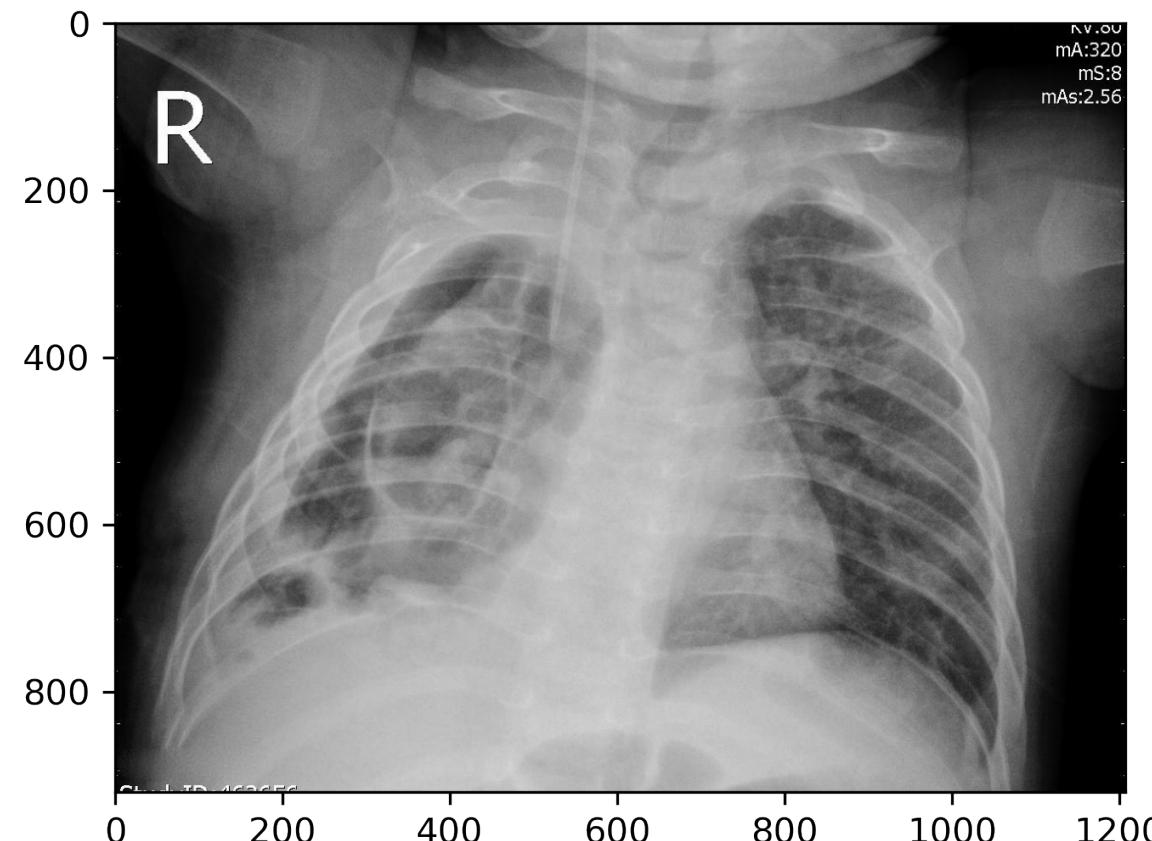


Data:



- Data is obtained from Kaggle
 - Contains 5856 validated chest X-ray images classified into **normal** and **pneumonia** classes.

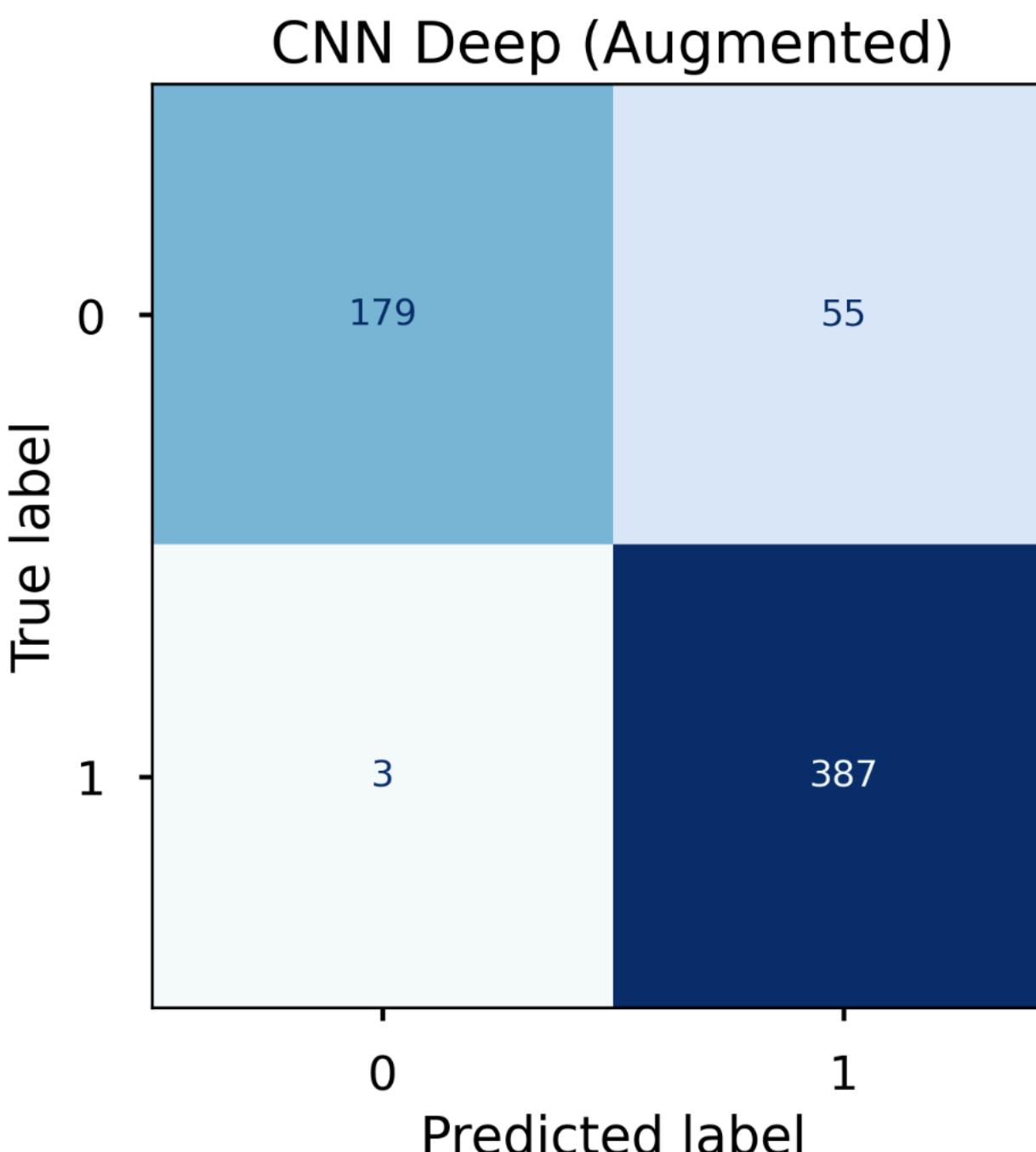
Goal:



- **Goal** is to build an **image classification neural network** that would accurately label the X-ray images. **Maximize the true positives** for pneumonia.
 - will reduce the **workload** of radiologists.
 - will **avoid any lag in treatment, patient care, and minimize the diagnosis time.**

Results from the Best Model:

- RECALL:
 - correct true predictions for a given class ($TP/(TP+FN)$)
- PRECISION:
 - correct true predictions out of all predictions ($TP/(TP+FP)$)



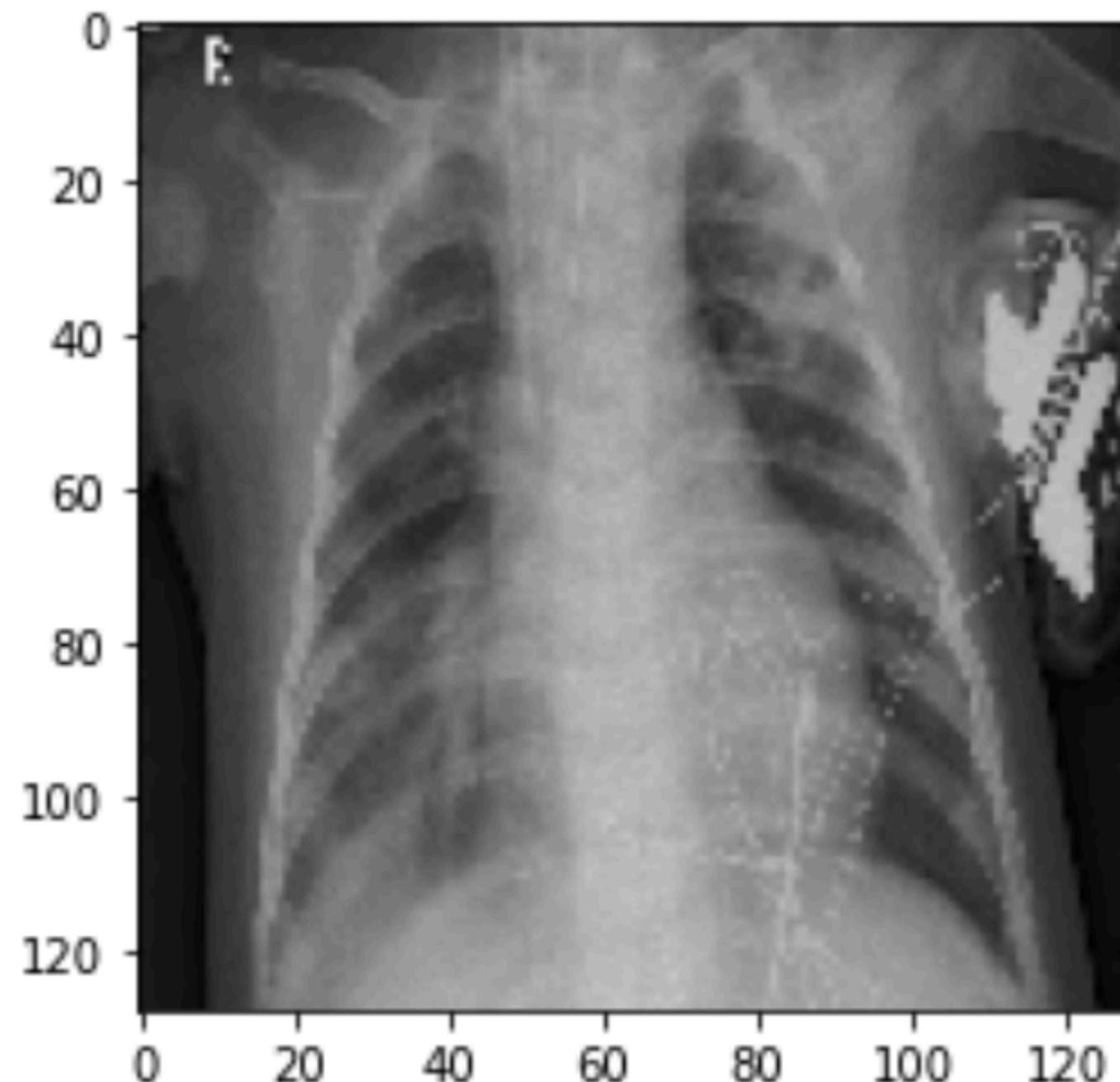
Only 3 out of 390 pneumonia cases are mis-labeled!

CNN Model with layers trained on augmented data

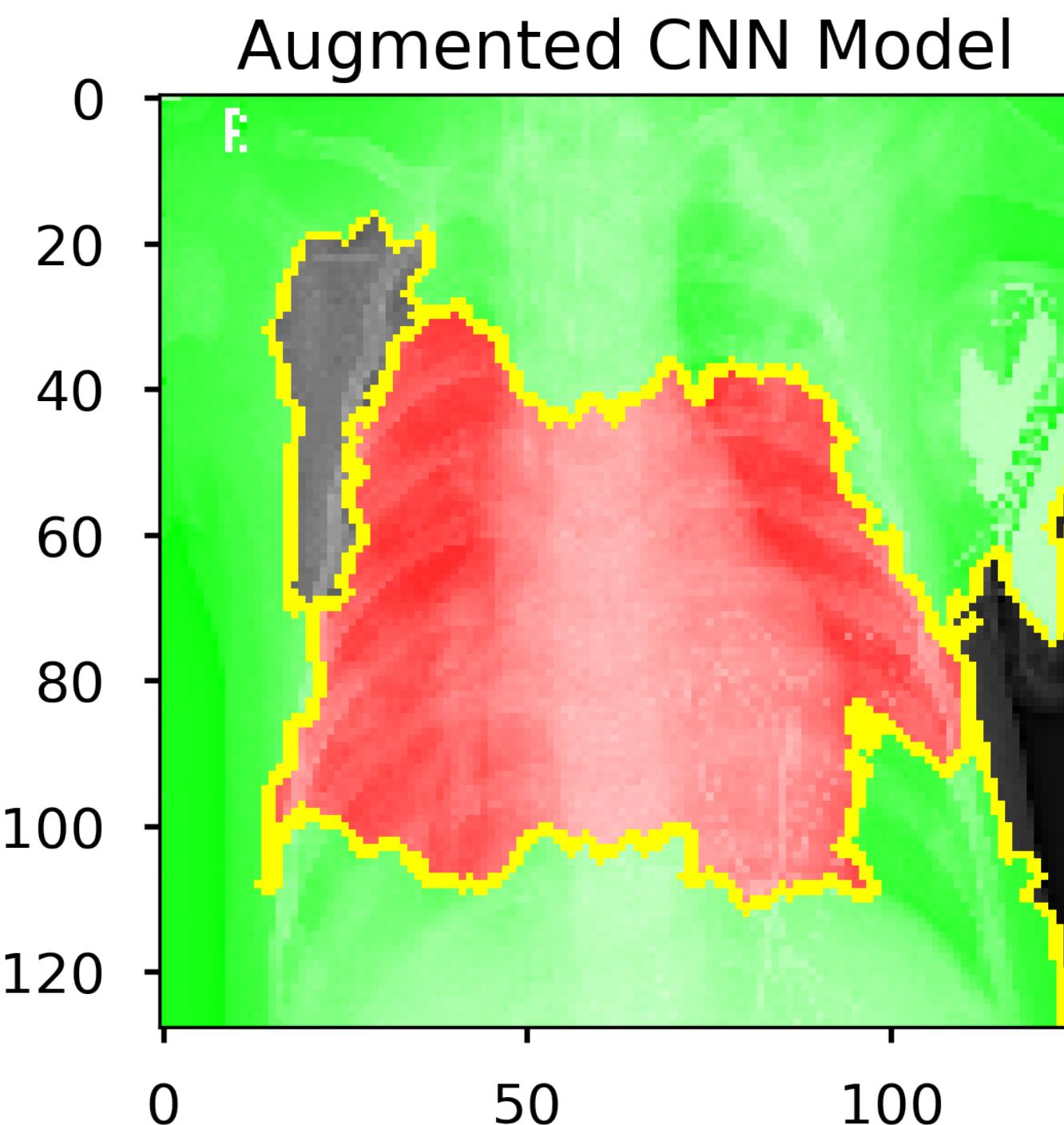
	Pneumonia	Normal
RECALL	99%	76%
PRECISION	88%	98%

*FP(False Positives), TP(True Positives), FN(False Negatives), TN(True Negatives)

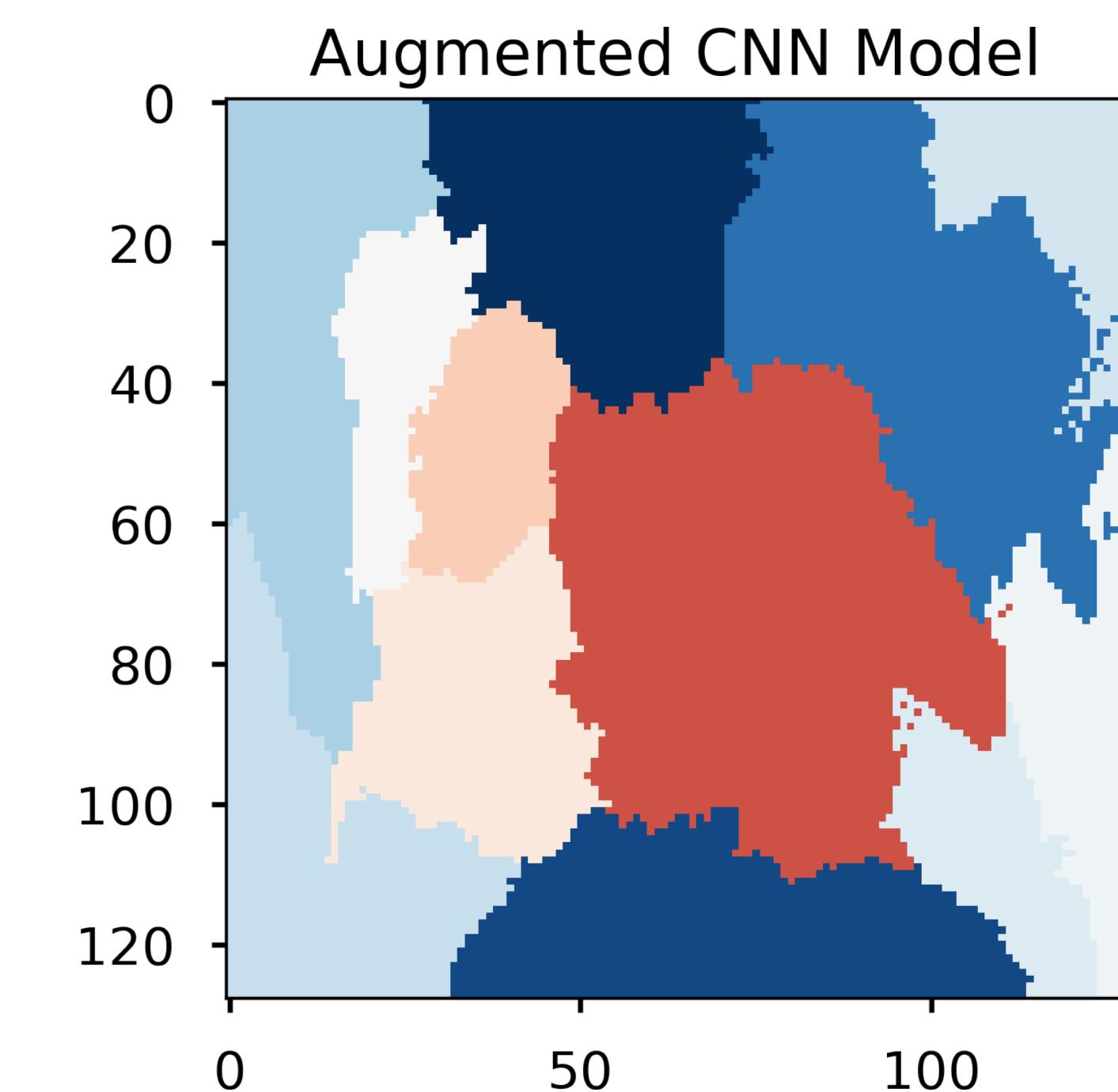
Example showing model work under the hood!



Original image



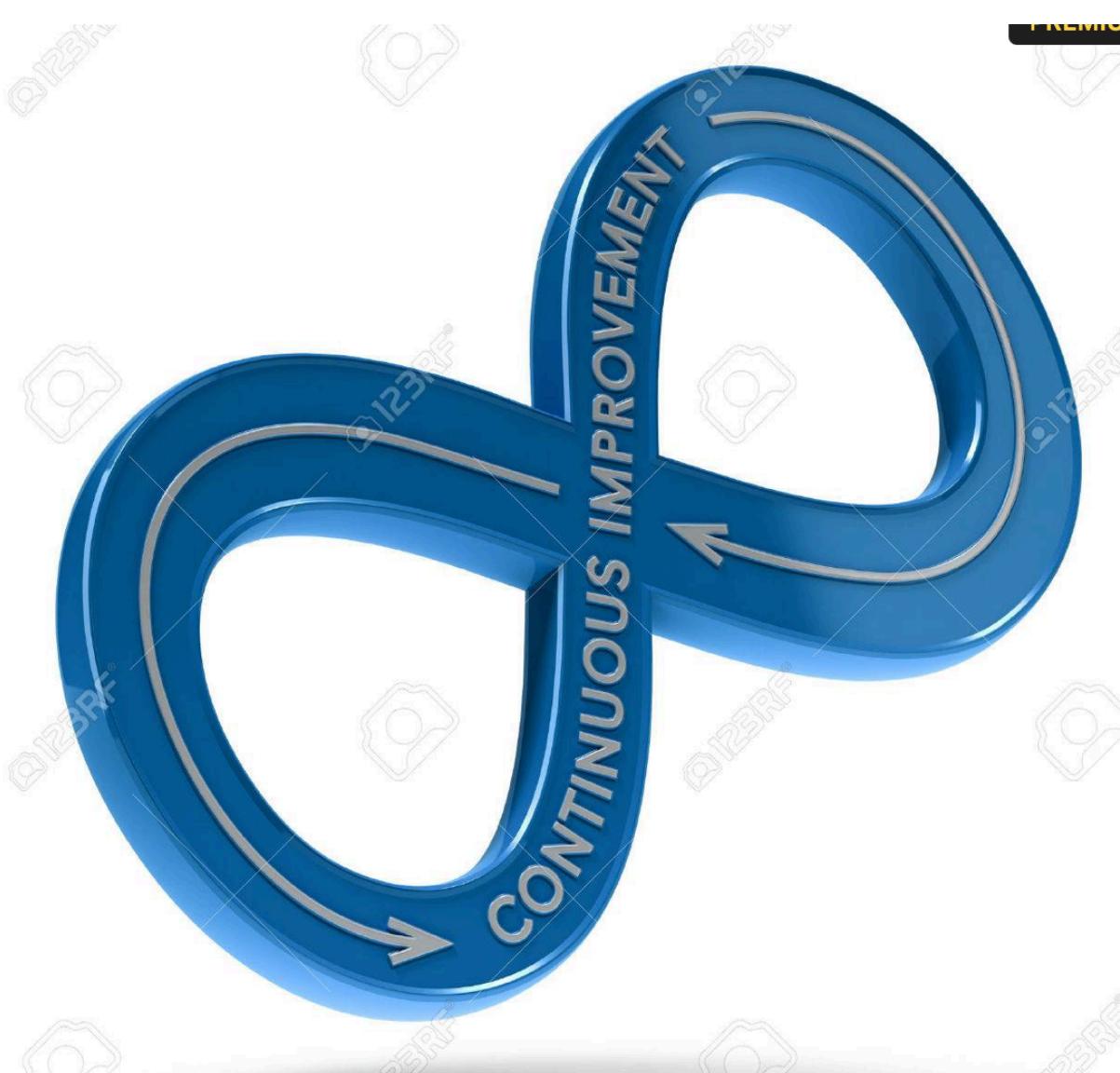
Mask Boundaries:
Towards (Green);
Against(Red)



Heatmap: the **more blue** it is, the
higher the **positive impact**!



Recommendations



- Use **neural nets** to classify X-ray images.
- Will yield **faster diagnosis, early intervention, reduction in waiting times.**

- Probably run model with **weights** in training to take into account **class imbalance**.
- Go deeper with labeling pneumonia cases as **bacterial/viral** .
- **Crop images** to get rid of unnecessary details.

Thank you!



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