



Aiding Radiology with AI

How image recognition can be a useful asset to radiology departments as well as improving patient experience.



Goal

Build a tool that will reliably identify patients with pneumonia so radiologists and doctors can prioritize those patients for quicker review, diagnoses, and treatment.

We emphasize:

- Sensitivity, so that no ill patients go unnoticed.
- Easy to use by your radiology department.

Data

Our data comes from Guangzhou Women and Children's Medical Center

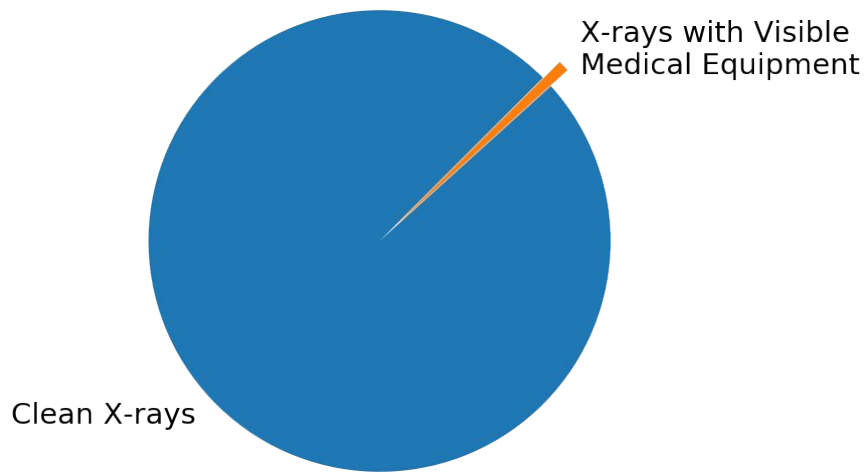
- Reviewed by two physicians to confirm the accuracy of the diagnoses.
- Includes bacterial and viral pneumonia.
- Uses anterior and posterior x-ray views.



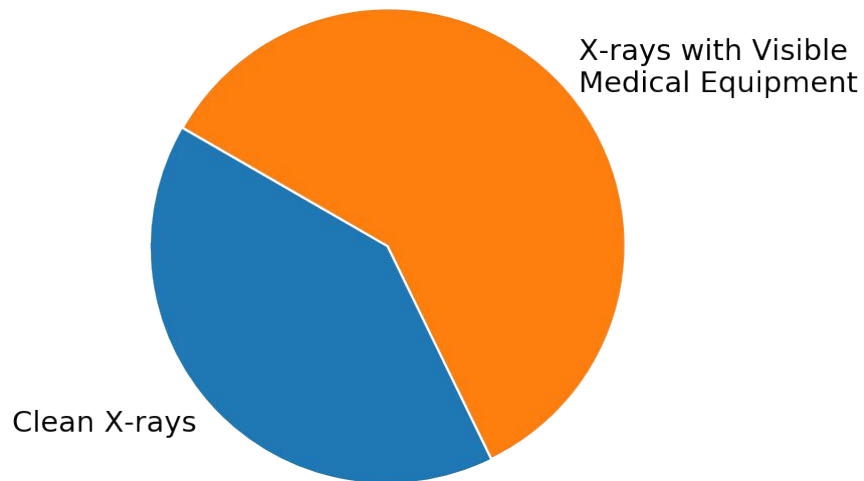
Data Cleaning



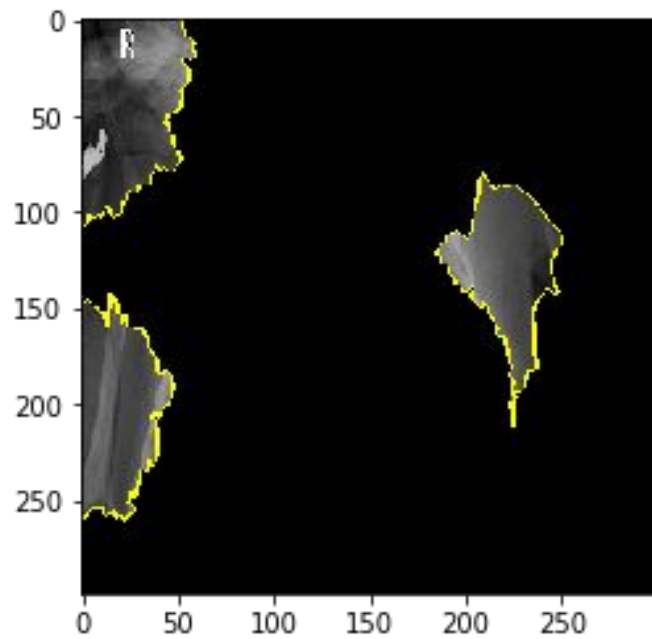
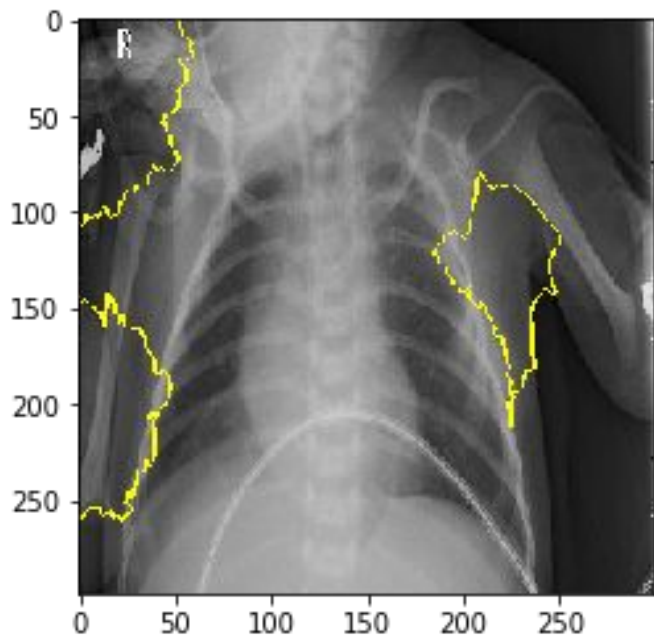
Healthy Lung X-Rays



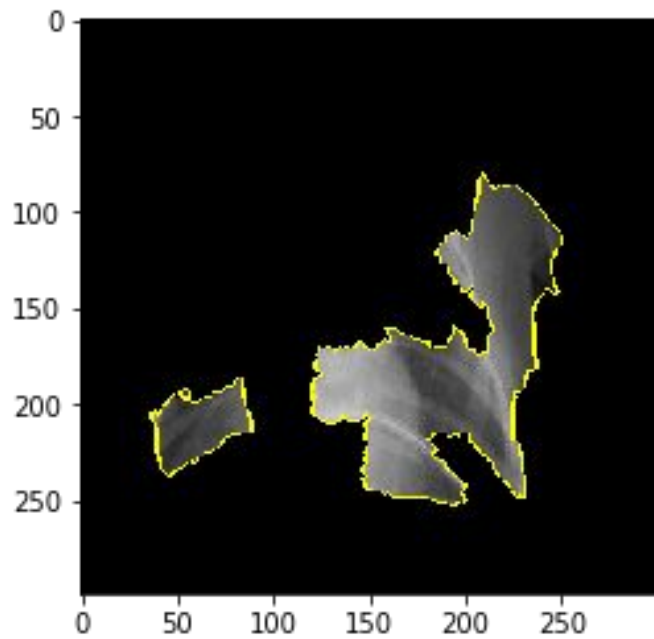
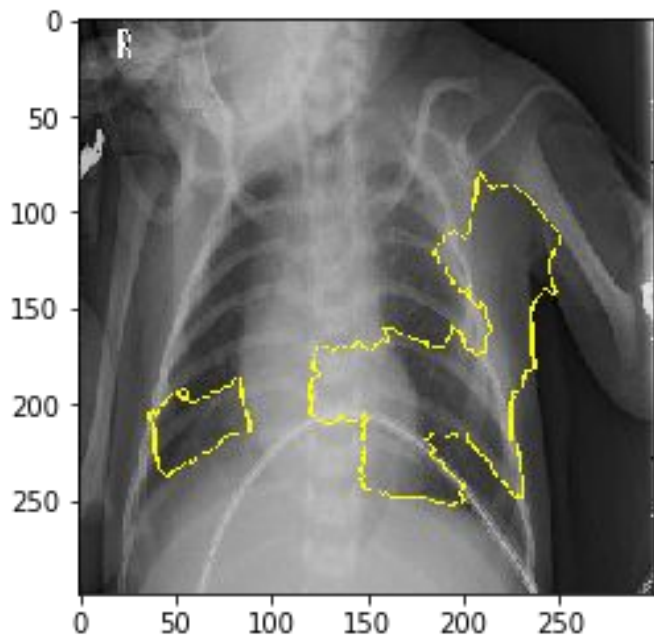
Pneumonic Lung X-Rays



First model prioritized medical devices.



Our new model looks at the lungs.

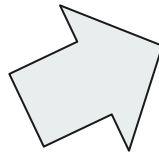
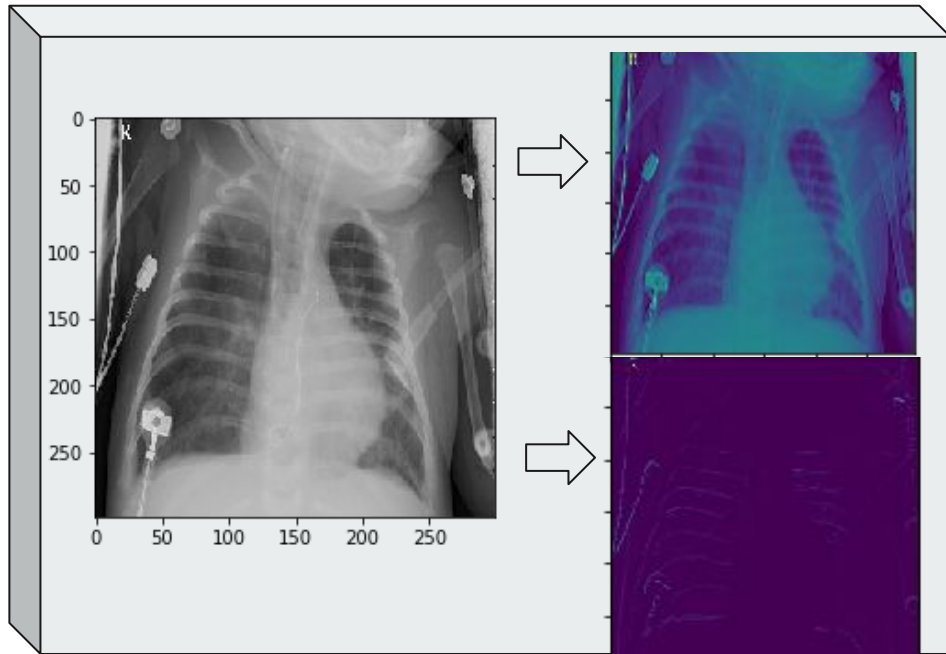


Advantages of Transfer Learning

Base layers understand the image



Top layers decide what the image is

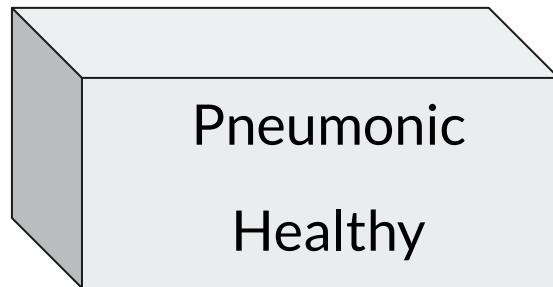
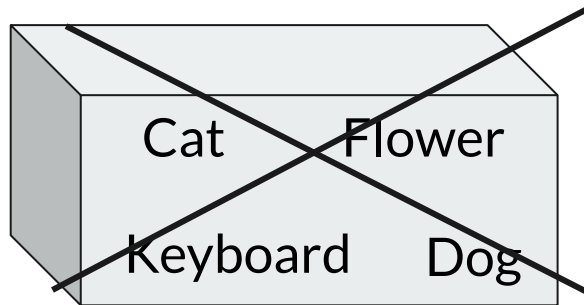
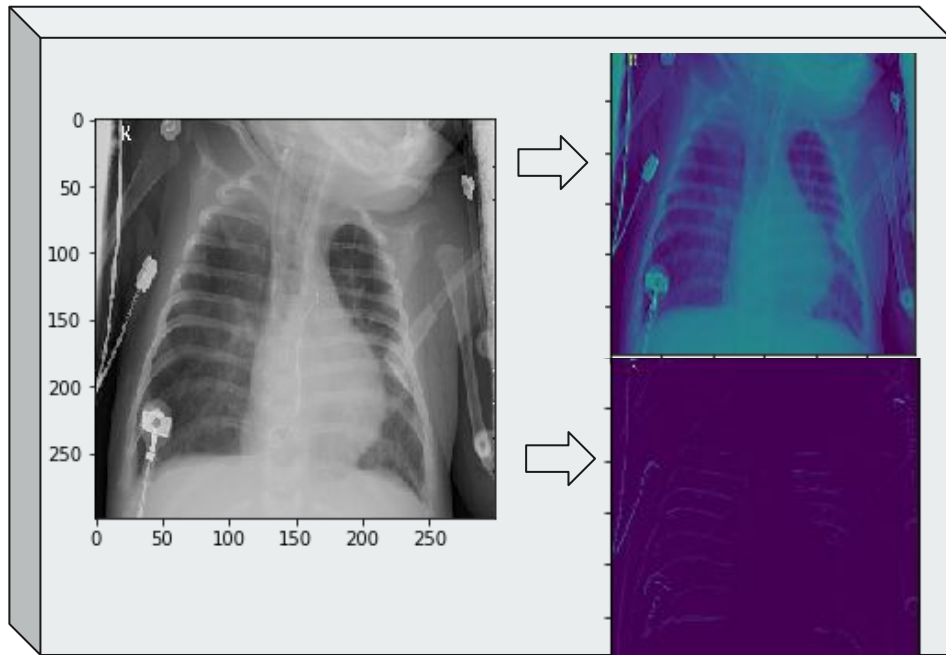


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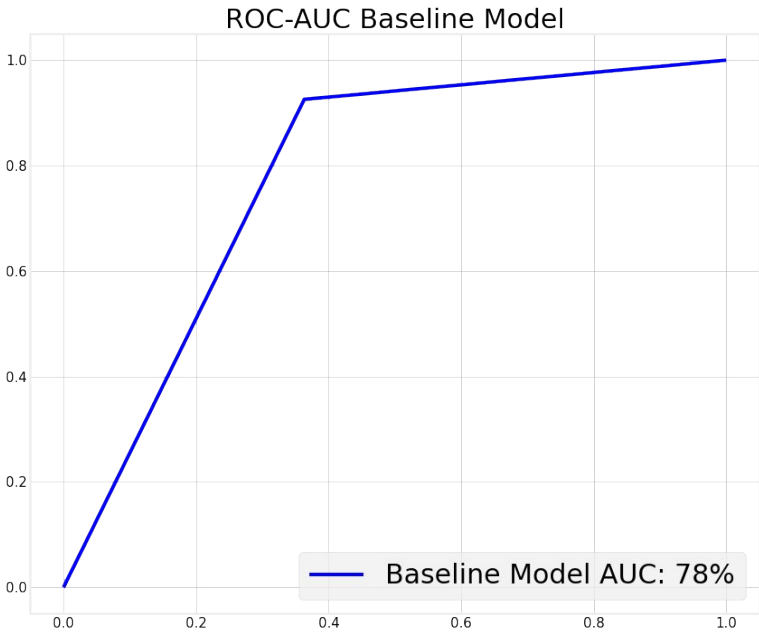
Baseline Model Performance

Sequential Model

- 3 Layers
- Relu & Sigmoid Activation

Out of the 390 chest x-rays indicating some form of Pneumonia, our model successfully flagged 361 of them.

The higher the AUC score, the better the model is at distinguishing x-rays indicating a form of Pneumonia or Normal



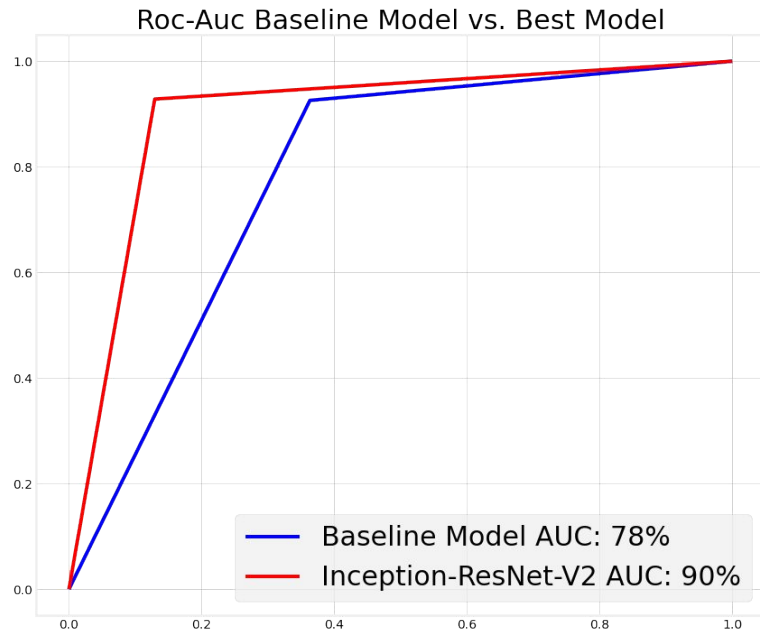
Recall (Sensitivity)	94%
Precision	80%
Accuracy	82%

Final Model Performance

Inception-ResNet-V2 Model (pre-trained)

- Fine-tuned
- Evaluated on unseen test x-rays

Out of the 390 chest x-rays indicating some form of Pneumonia, our model successfully flagged 380 of them.



Recall (Sensitivity)	97%
Precision	91%
Accuracy	93%



How it Can Help

- Provide Radiology teams with a method to validate initial Pneumonia screenings
- Reduce the rate of misdiagnosis in patients with Pneumonia diagnosed as healthy
- Provide Healthcare Administrators with more insight to the possibilities of incorporating AI into radiological imaging
- Cloud deployment to assist radiologists without AI resources to immediately screen patients



Next Steps

- Build a dashboard to describe model performance
- Provide a Web App that allows users to upload x-ray images for quick diagnoses
- See how well the model generalizes to other ailments identified by x-rays
- Model to classify the severity of Pneumonia and type (Viral vs Bacterial)



Thank You

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