

Decreasing the cost of diagnosing pneumonia

Kevin Spring

27 January 2023

Presentation Outline

- Business Problem
- Business Solution
- Data / Model Metrics
- Deployed Prototype
- Recommendations
- Next Steps

Business Problem

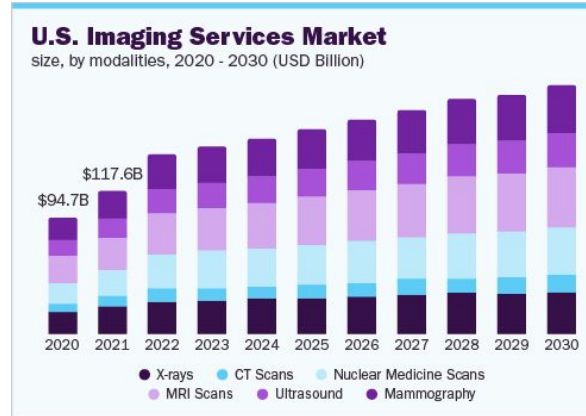
Pneumonia healthcare costs



United
Healthcare



1 million people are admitted



5% increase in medical imaging
each year



Shortage of radiologists

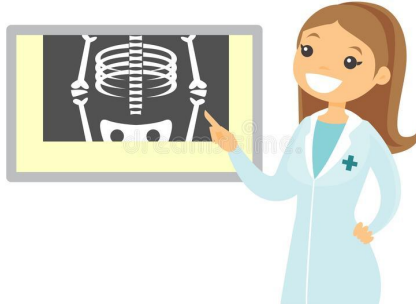
Business Solution

Develop app to diagnose pneumonia from chest X-rays using AI



NORMAL

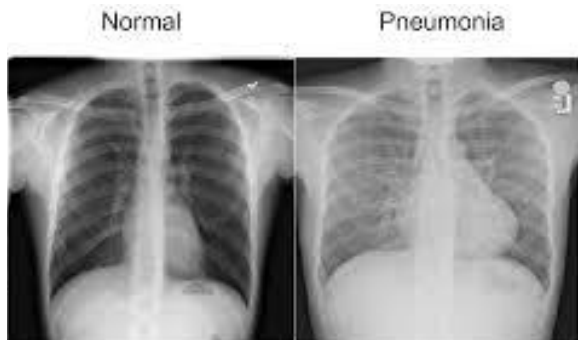
- Radiology is not consulted
- Other illness are quickly investigated



PNEUMONIA

- Chest X-ray is forwarded to a radiologist for official diagnosis

Data and model results



5,863 labeled X-ray images

- 27% normal
- 73% pneumonia
- Normal data given more weight to correct for imbalance

Model Criteria

- ❑ 90%+ accuracy
- ❑ 90%+ specificity to designate a normal x-ray as normal
- ❑ < 5% false negative rate

Chest X-ray Classification Metrics

Accuracy: 96%
Specificity: 92%
False Negative Rate: 2.8%

		Prediction	
		Normal	Pneumonia
Actual	Normal	293 True Negatives	24 False Positives
	Pneumonia	24 False Negatives	831 True Positives

Classification App

Phase 1

Symptoms of Pneumonia

The patient presents to the clinic with symptoms of pneumonia

Phase 2

Chest X-ray

Patient receives diagnostic chest X-ray

Phase 3

Pneumonia Detection App

X-ray images are fed into the classification application.

Phase 4

Radiologist Confirmation

Radiologist confirms or rejects the app's classification of pneumonia.

Pneumonia classification from chest X-ray

Upload a Chest X-ray Image for image classification as pneumonia or normal

Upload the chest X-ray...



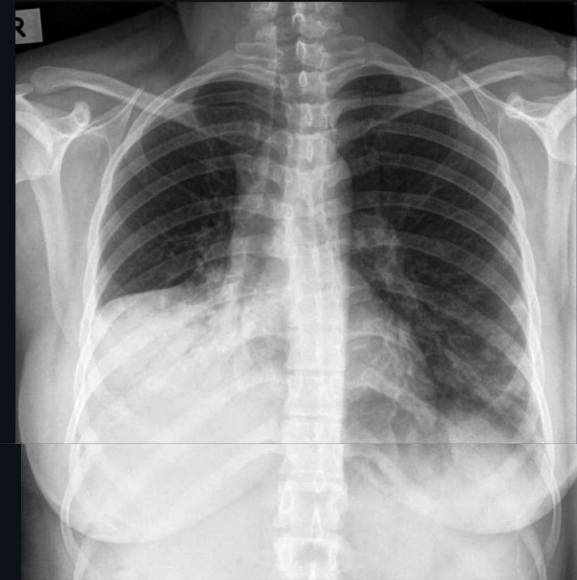
Drag and drop file here

Limit 200MB per file • JPG, JPEG

Browse files



consolidation-rml.jpg 174.9KB



Uploaded Chest X-ray.

Classifying...

The chest X-ray indicates pneumonia

Next Steps

Test

Test pneumonia classification app with our partner hospital and clinics

Improve

Implement classification feedback in the app to collect more data

Implement

Continuously improve the model with new data

Thank you!

Email: kevinjspring@gmail.com

Website: kevinspring.com