Decreasing the cost of diagnosing pneumonia

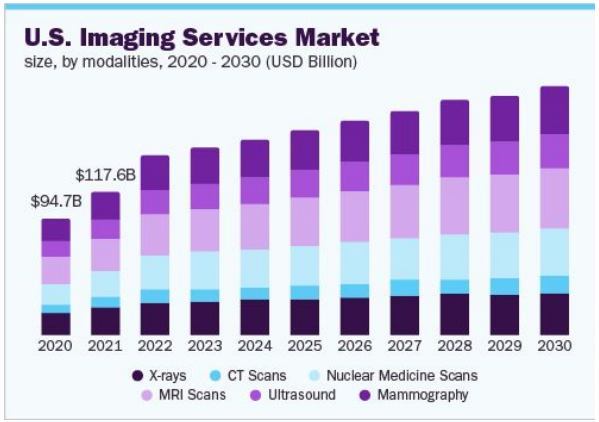
Kevin Spring
27 January 2023

Presentation Outline

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

Business Problem
Pneumonia healthcare costs

United Healthcare



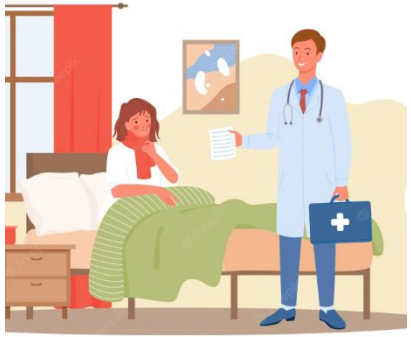
1 million people are admitted

5% increase in medical imaging each year

Shortage of radiologists

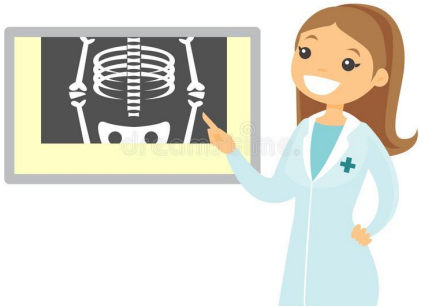
Business Solution

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



NORMAL

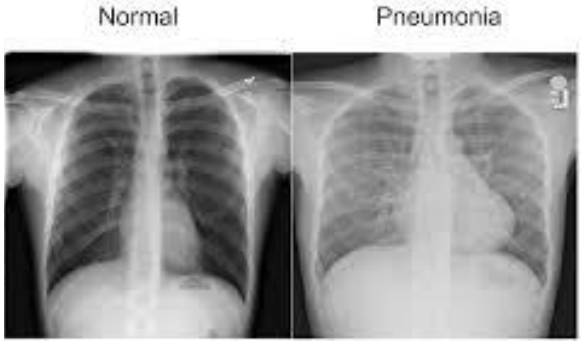
- Radiology is not consulted
- Other illness are quickly investigated



PNEUMONIA

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

Data and model results



5,863 labeled X-ray images

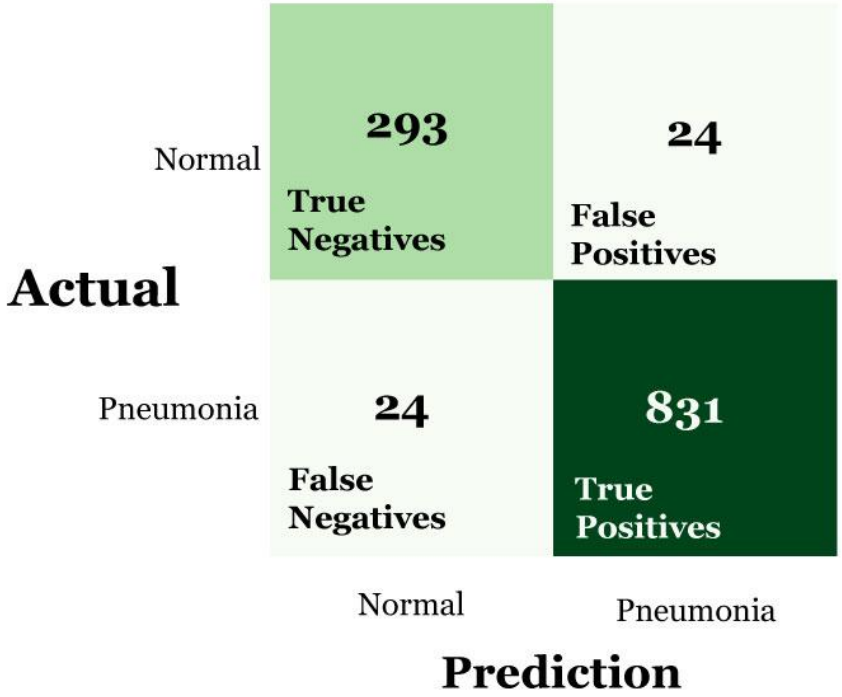
- 27% normal
- 73% pneumonia
- Normal data given more weight to correct for imbalance

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%



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

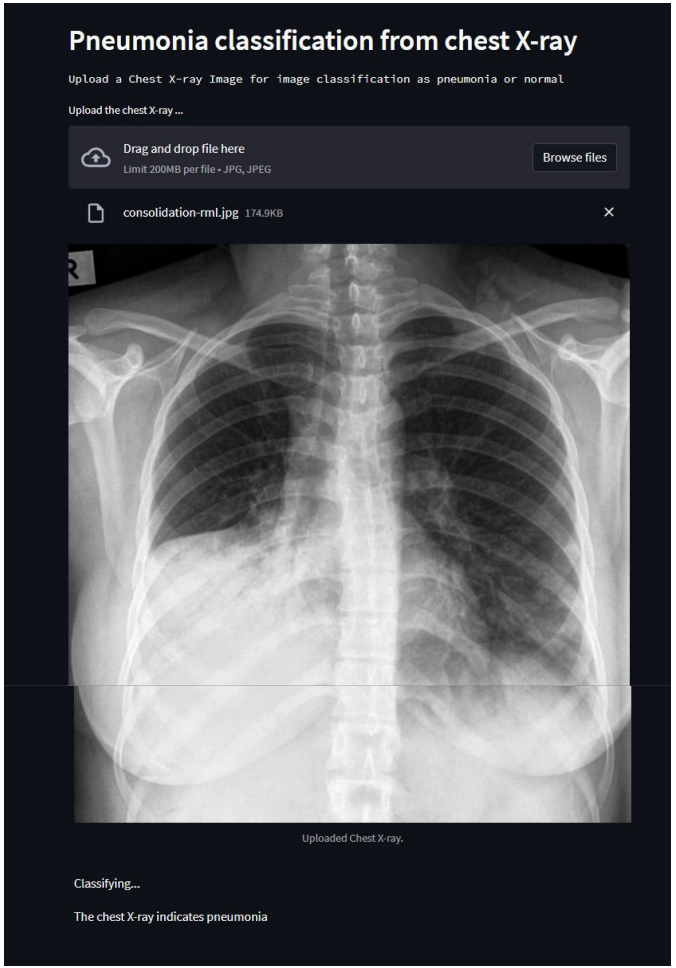
Pneumonia Detection App

X-ray images are fed into the classification application.

Phase 4

Radiologist Confirmation

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



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