Deep Learning & Pneumonia Detection

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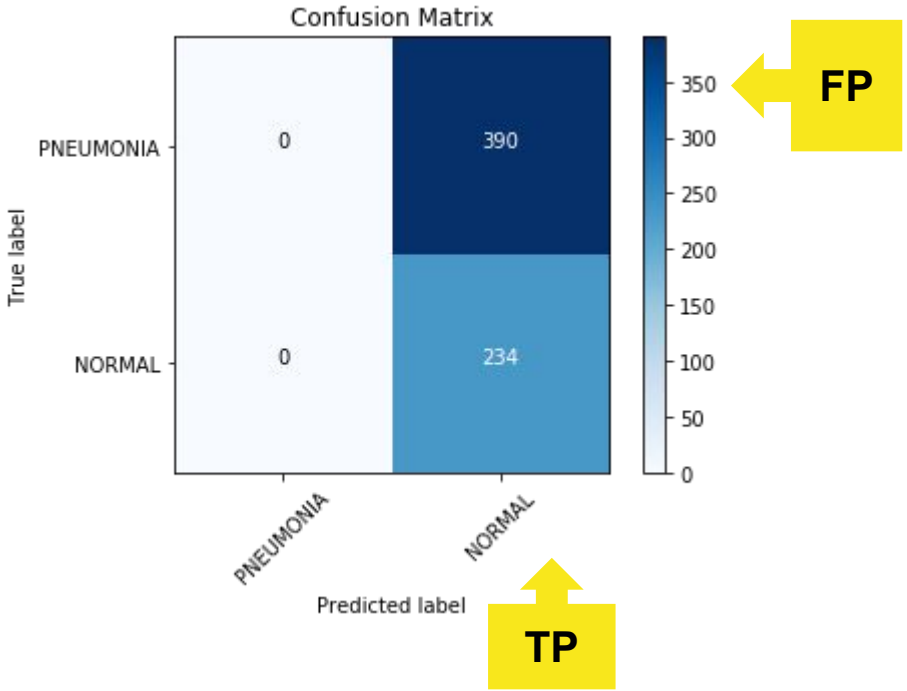
Scope of Work and Background

Project Scope: Build a model that can classify whether a given patient has pneumonia, given a chest x-ray image.

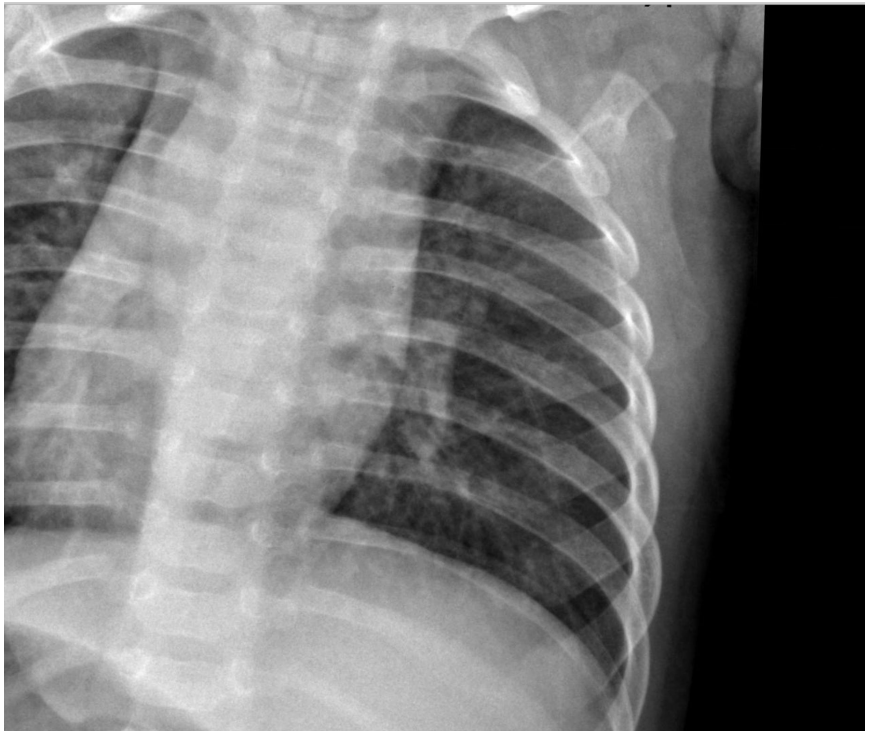
Model Insights



Out of 624 Test Images:

- **True Negatives: 0**
- **False Negatives: 0**
- **False Positives: 390**
- **True Positives: 234**

What are the Pros and Cons of Using X-Rays for Detection?



Pros:

- Fast way to view internal organs & and air-filled parts
- Inexpensive (For Medical professionals)
- Fast turnaround time on results

Cons:

- Images can be difficult decipher
- Can't detect the type of bacteria or source
- Can be costly for patients:
    - With Health Insurance: $0 - $50
    - Without Health Insurance: $200 - $400

Can COVID-19 be Detected Via Chest X-Ray?

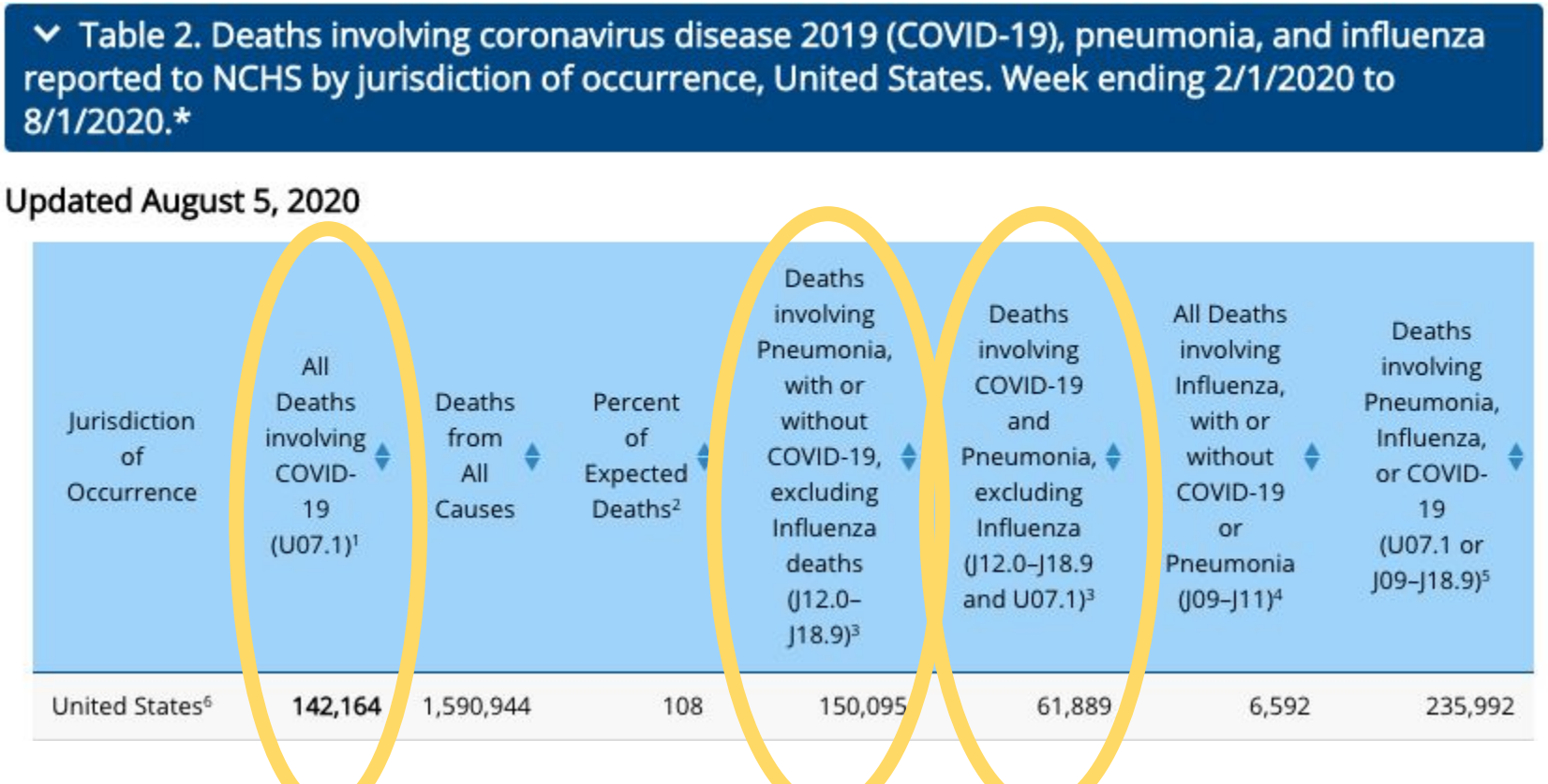
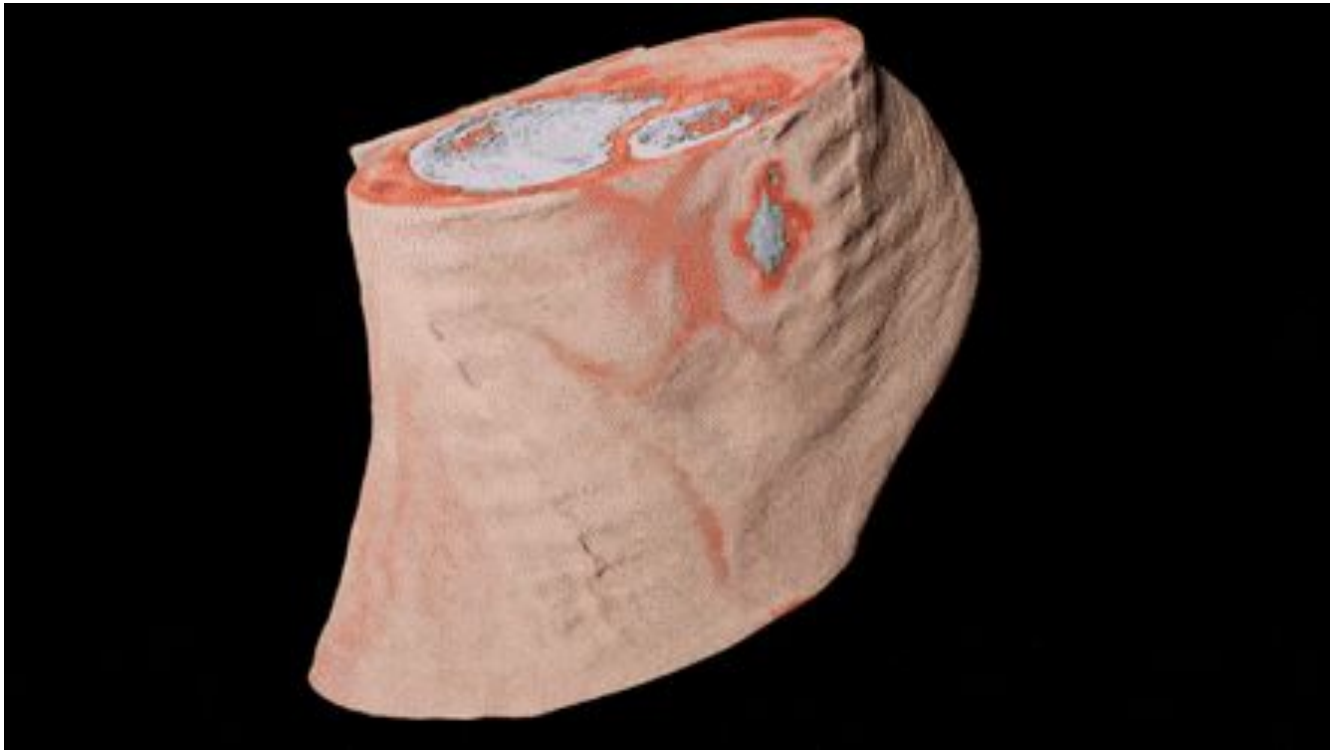


Table 2. Deaths involving coronavirus disease 2019 (COVID-19), pneumonia, and influenza reported to NCHS by jurisdiction of occurrence, United States. Week ending 2/1/2020 to 8/1/2020.*

Updated August 5, 2020

Jurisdiction of Occurrence	All Deaths involving COVID-19 (U07.1)[1]	Deaths from All Causes	Percent of Expected Deaths[2]	Deaths involving Pneumonia, with or without COVID-19, excluding Influenza deaths (J12.0–J18.9)[3]	Deaths involving COVID-19 and Pneumonia, excluding Influenza (J12.0–J18.9 and U07.1)[3]	All Deaths involving Influenza, with or without COVID-19 or Pneumonia (J09–J11)[4]	Deaths involving Pneumonia, Influenza, or COVID-19 (U07.1 or J09–J18.9)[5]
United States[6]	**142,164**	1,590,944	108	150,095	61,889	6,592	235,992

Why Aren’t X-Rays Taken in Color?



Recommendations

- X-Rays should be used as a secondary method of COVID-19 detection.
- X-Ray exams for the Top-10 deadliest diseases should have set income based prices, and be offered free in the case of a Global Pandemic
- The government should fund research efforts to introduce 3D, color scans for medical use

- Add double the amount of chest x-ray images to increase model performance to at least 75%
- Train on Larger images (> 64 x 64)
- Convert to images to color (RGB) and train and compare performance accuracies
- Compare the chest X-rays of a patient with COVID-19 vs pneumonia
- Compare the accuracy and speed on of the best model to top radiologists visually inspecting and diagnosing pneumonia via X-Rays before recommending Ai be involved as method of detection.

Thank You!