Pneumonia Detection

with Deep Learning

An analysis for healthcare systems

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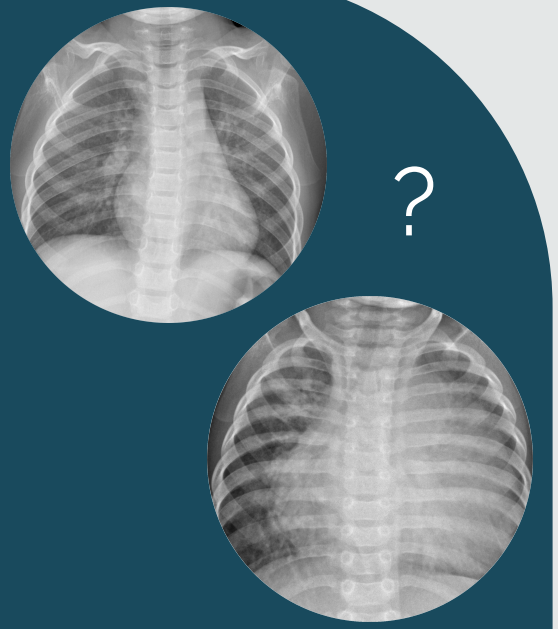
Why do we care?

Pneumonia refers to lung infections like those caused by Covid-19. A good Machine Vision model could assist medical systems by:

- Scaling healthcare to more people
- Checking professionals, increasing accuracy
- Reducing workload and cost
- Provide foundations for future automation

What's our data?



- Data provided by UCSD, containing over 5000 X-ray images of children* aged 1-5
- Data generation used to increase size of dataset
- Class imbalance: 3 times as many unhealthy lungs

Our Goal: Automate pneumonia diagnosis

*An additional model will probably need to be trained for adults

Our Analysis

1.) Data Cleaning and Processing

- Visual Inspection
- File Preparation
- Data Generation

2.) Deep Learning

- Convolutional Neural Nets
- Iterative modeling
- Hyperparameter Tuning

3.) Evaluation and Implementation

- Model Validation
- Final Model Selection
- Next Steps

Findings

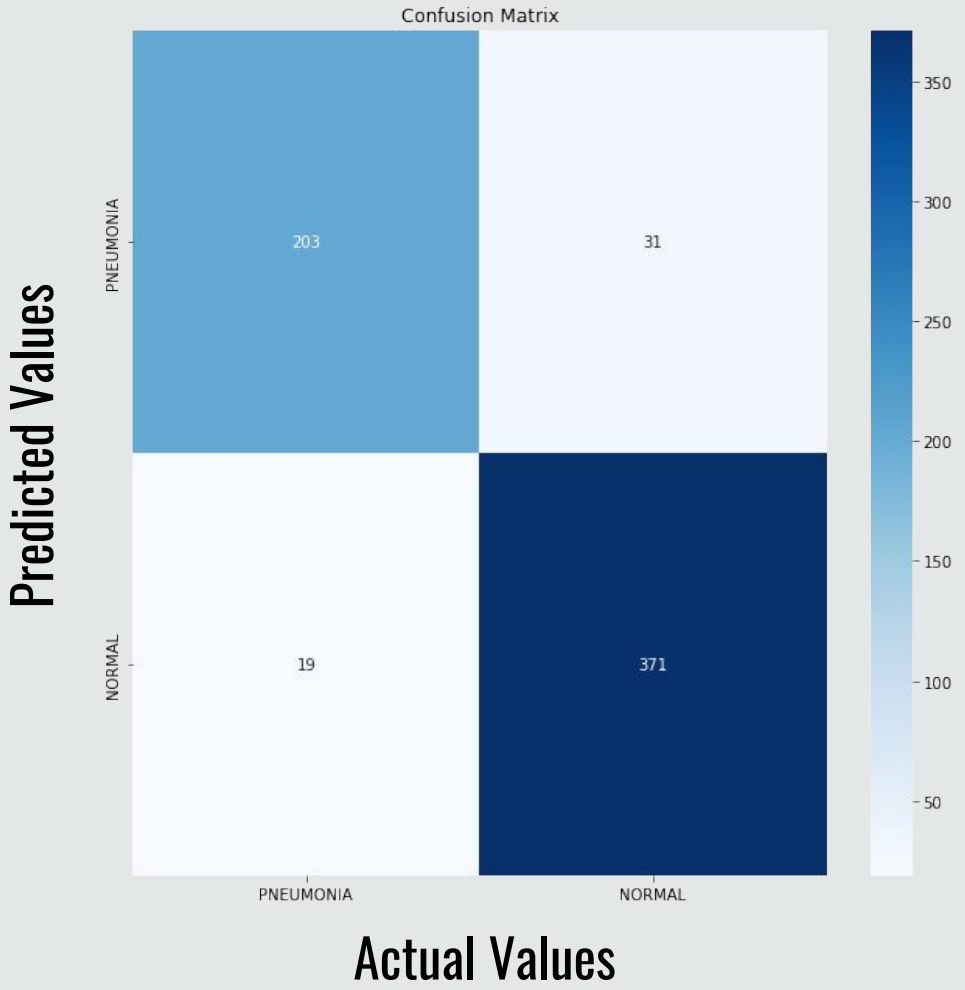
Can Deep Learning save lives?

Can Deep Learning Save Lives?

- Test accuracy around 92%
- Can inspect thousands of cases per hour
- Extremely affordable compared to other options
- Can double-check current diagnoses

Confusion Matrix

Test Results:
F1: - 94%
Precision: - 92%
Recall: - 95%
Accuracy: - 92%



Recommendations

What's Next?

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Process Integration:
Talking to target users and supporting them with a simple UI, or centralizing image processing by taking in images from many medical facilities

More computation or Data:
It's likely that these models can continue to be improved with more computation and X-Ray Images

More X-Ray Machine Learning:
Can broken bones be identified? What about tumors or cancers? What do doctors struggle with?

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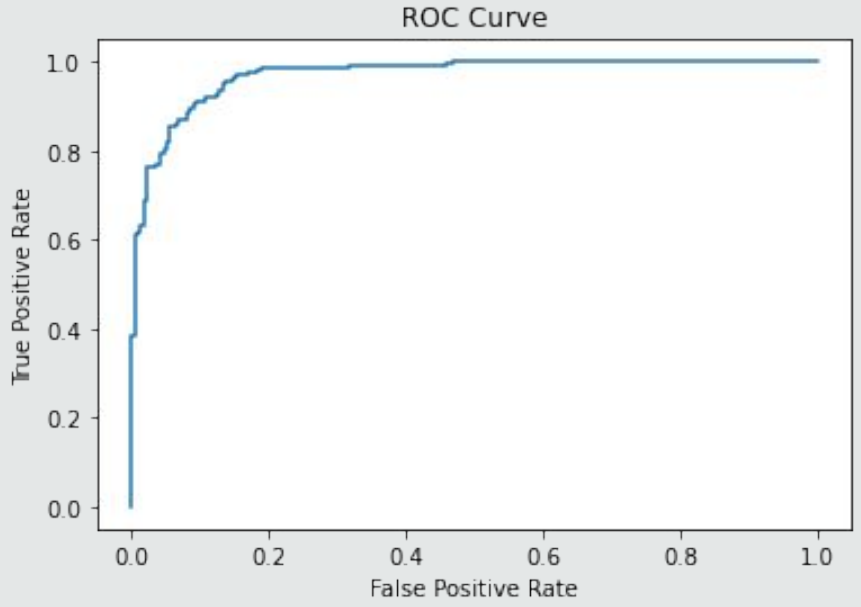
Thank You!

Questions?

Appendix - Technical Details



Training History