Chest X-ray Classification

Image Classification to Detect Pneumonia in Pediatric Patients

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Summary

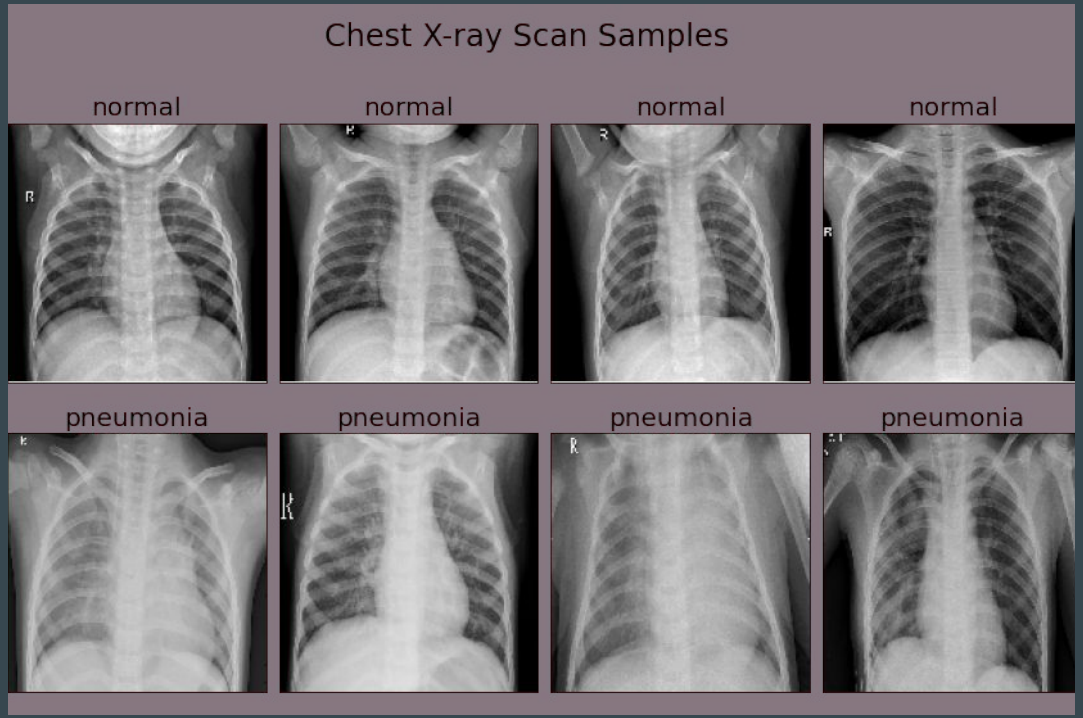
Utilizing an iterative process, identified the most performant classification CNN model to diagnose pneumonia in pediatric patients, based on chest X-ray scan images.

Overview

- Context
- Data
- Introduction to CNN Modeling
- Iterative Process Description
- Model Results/Evaluation
- Limitations/Next steps
- Thank you

Context

Pneumonia is characterized by abnormal opacification visible in lung cavities.

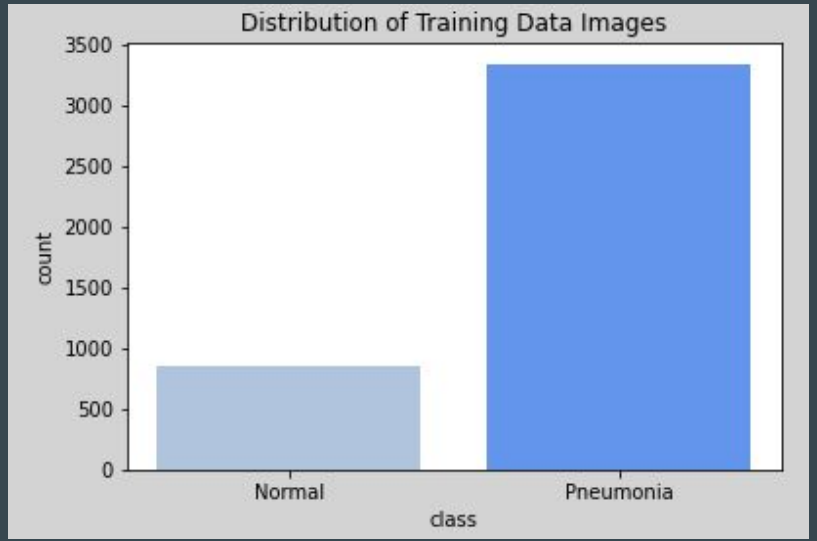


- Automated systems = Efficiency
- Sensitive to details that are nearly invisible to the human eye

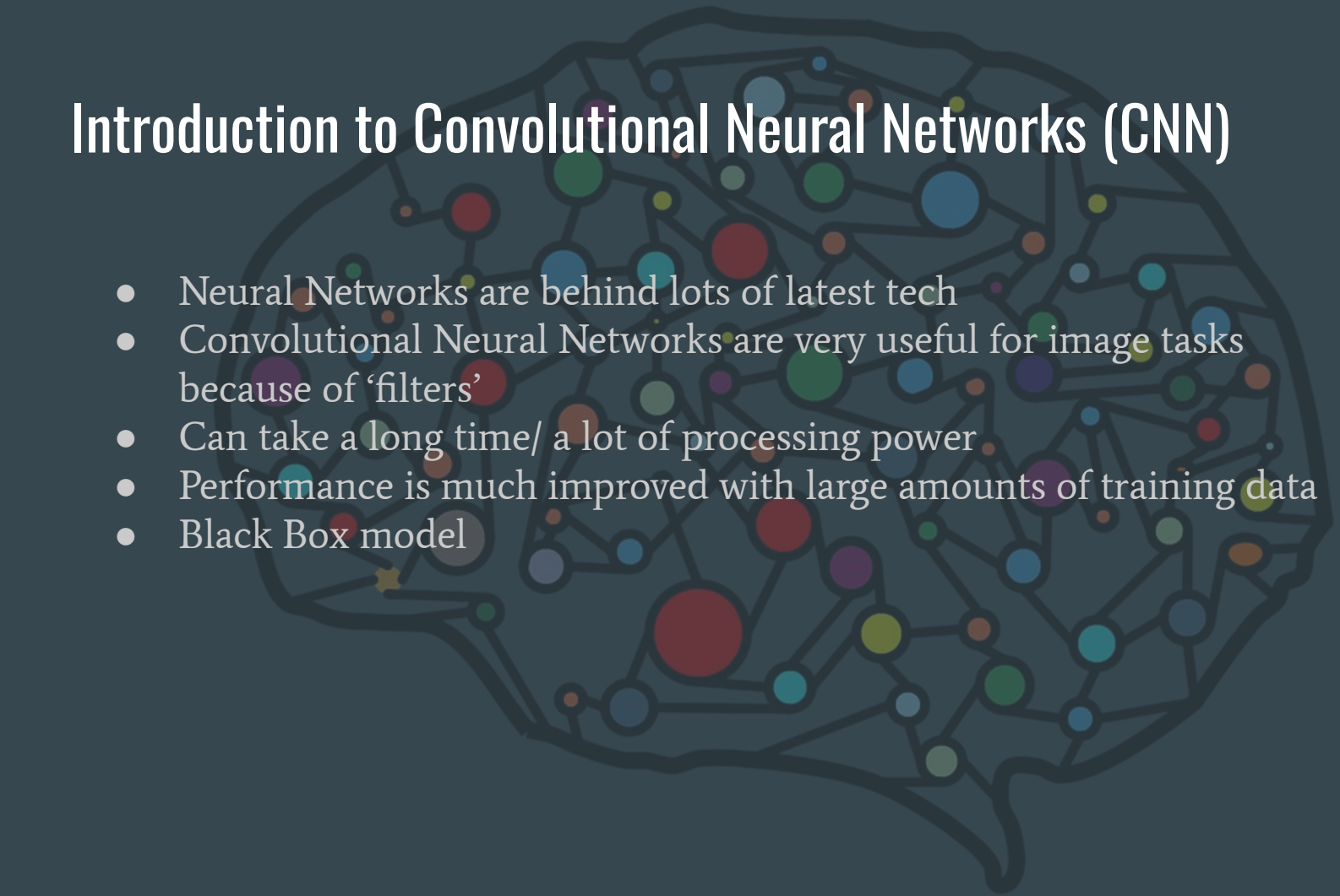
Data

- 5k+ images (3 sets: train, validate, test)
- Pediatric patient chest X-rays
- Labels applied by group of doctors

Training subset has strong class imbalance ↳



Introduction to Convolutional Neural Networks (CNN)



- Neural Networks are behind lots of latest tech
- Convolutional Neural Networks are very useful for image tasks because of ‘filters’
- Can take a long time/ a lot of processing power
- Performance is much improved with large amounts of training data
- Black Box model

Iterative Process

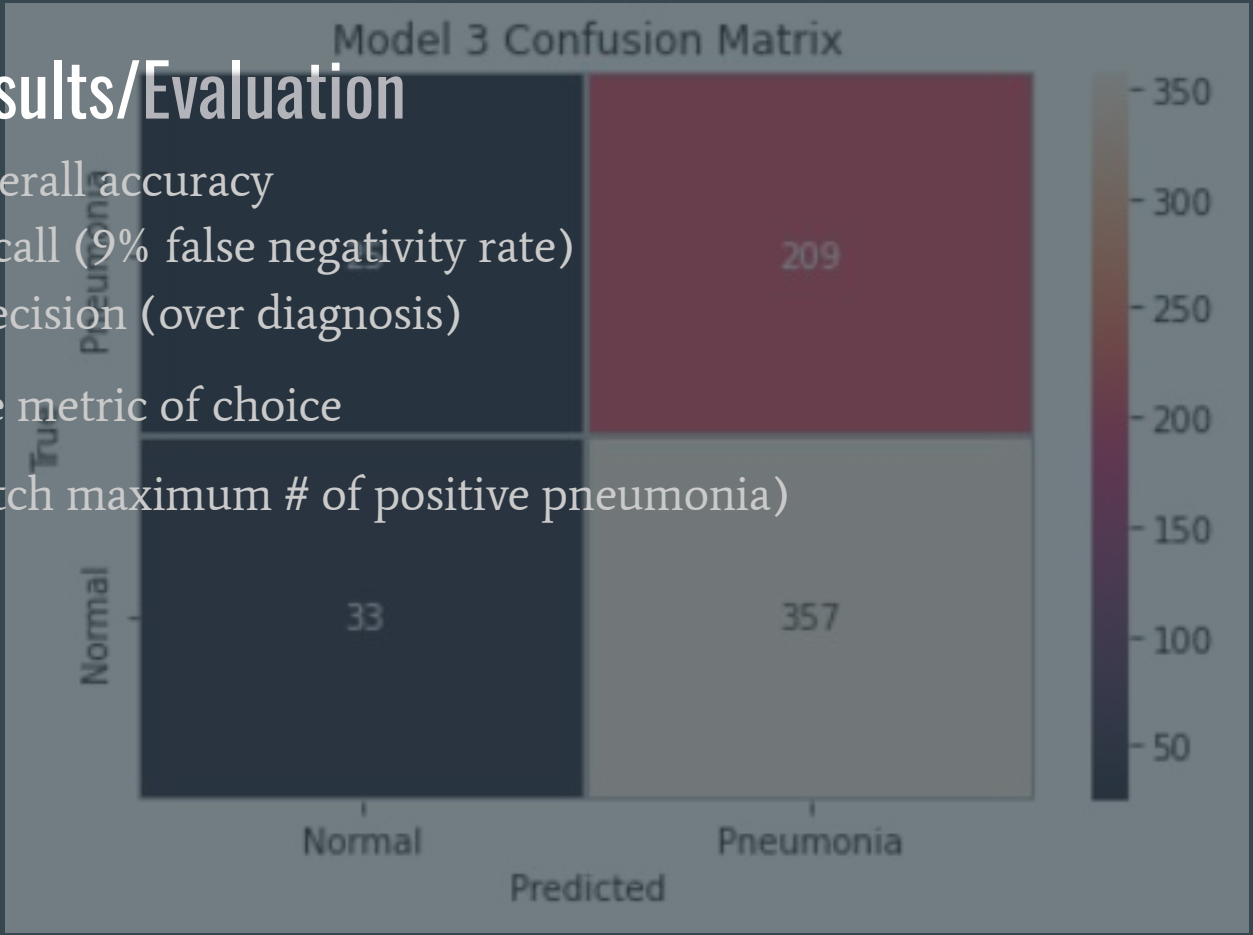
- Start w/ basic model
- Attempt 2 rounds of adding complexity
- Assessed each model's predictive ability
- Identified most performant model & attempt to improve by adjusting hyperparameters (settings)

Model Results/Evaluation

- 61% Overall accuracy
- 91% Recall (9% false negativity rate)
- 63% Precision (over diagnosis)

Recall is the metric of choice

(want to catch maximum # of positive pneumonia)



Limitations/Next Steps

- Consider a different performance metric
- More complex models (layers/hyperparameters) could have better results
- Generate more training data with augmentation

Thank You!

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