Advancing Pneumonia Diagnosis

with Deep Learning

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Overview

- Business Problem
- Data & Methods
- Modeling
- Evaluation
- Conclusions

Business Problem

Stakeholder:

Children's Hospital

Context:

- **Increase in demand** for pneumonia diagnoses
- **Limited availability** of radiologist
- **Inconsistent diagnoses** from GPs

Business Problem

How can we enhance the **efficiency and accuracy** of diagnosing pediatric pneumonia?

Summary

Source

Guangzhou Women and Children's Medical Center

Method

Neural networks

Findings

Correctly Identifies:

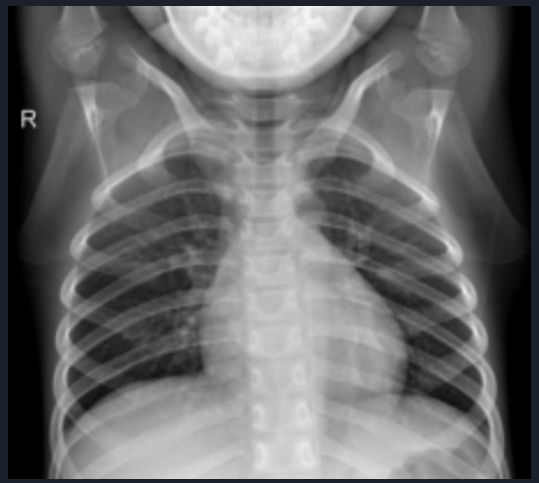
- **97%** Pneumonia Cases
- **96%** All Cases

Data

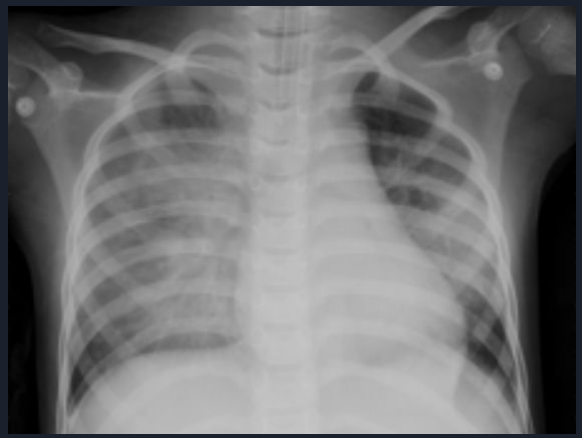
Chest X-Rays

- 5,863 images
- Ages: 1-5 Years

Normal



Pneumonia



Data

Chest X-Rays

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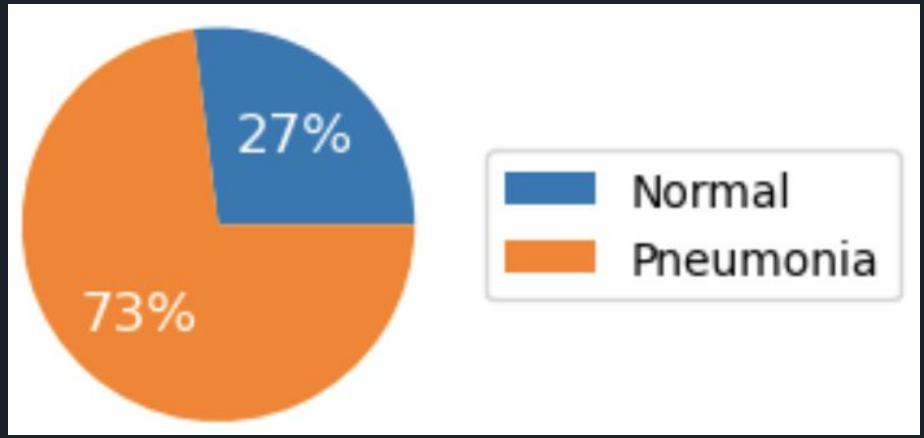


Metrics

Cost of **False Negative** is high!

Metrics

Accuracy

- Percentage of **All Cases** identified correctly.

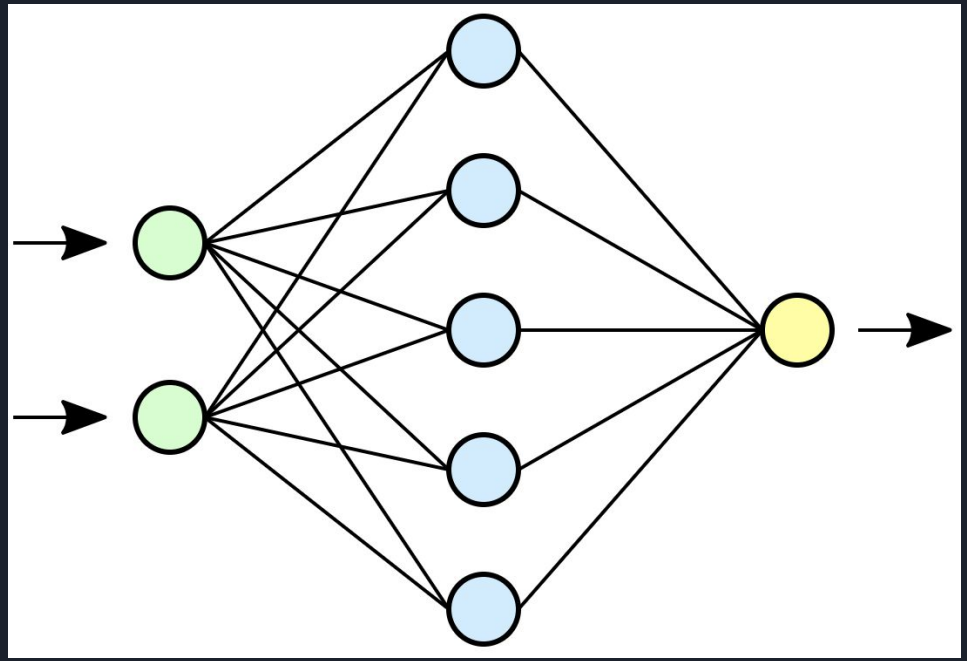
Sensitivity

- Percentage of **Pneumonia Cases** identified correctly.

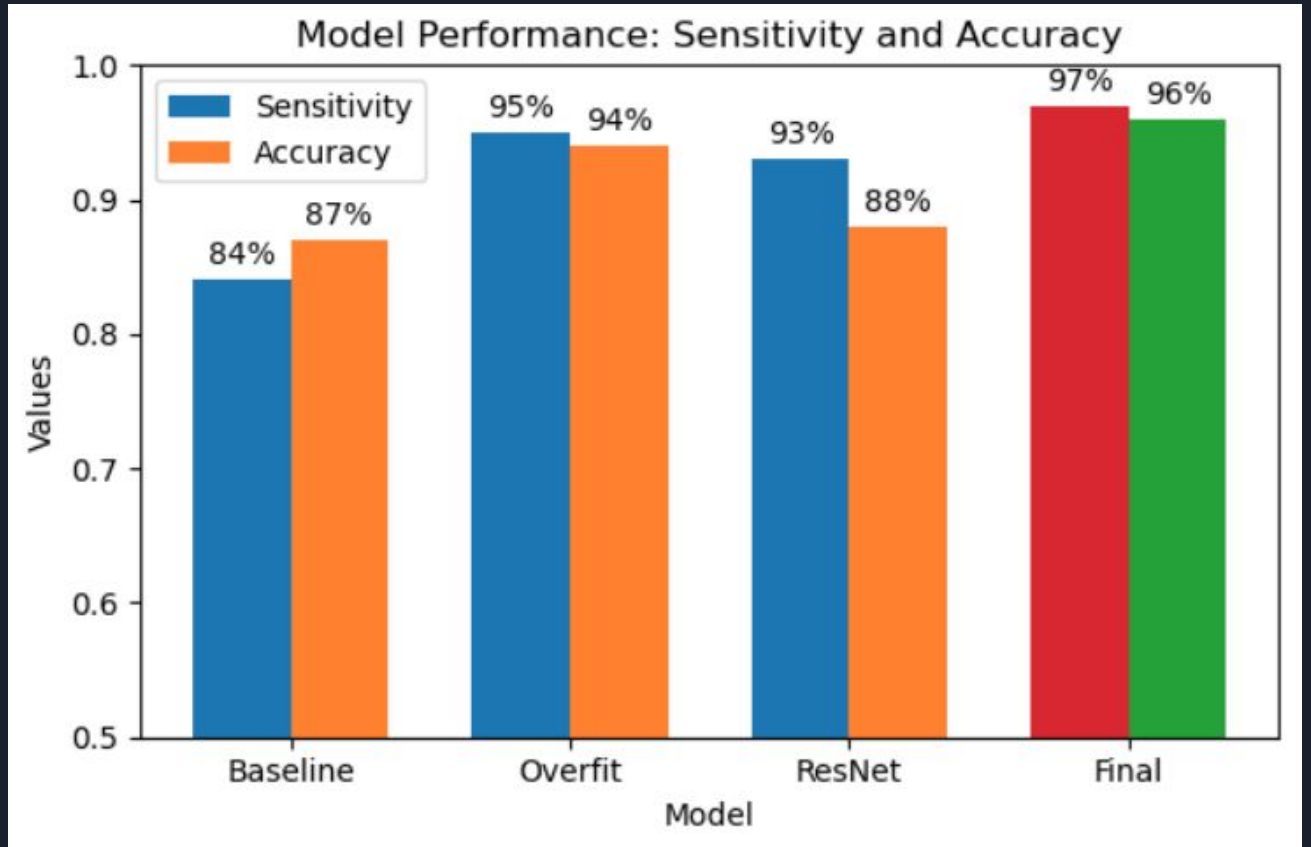
Model Iteration

Neural Network

- Baseline
- Many Models
- Pretrained ResNet50



Evaluation


Model Performance: Sensitivity and Accuracy
Sensitivity
Accuracy
84%
87%
95%
94%
93%
88%
97%
96%
1.0
0.9
0.8
0.7
0.6
0.5
Values
Baseline
Overfit
ResNet
Final
Model

Conclusion

Best model

Correctly Identifies:

- **97%** Pneumonia Cases
- **96%** All Cases

Recommendation:

Incorporate model into diagnosis workflow.

Conclusion

Limitations

- X-Ray Images are from one hospital
- Selected for High Quality
- Computational Resources

Next Steps

- **Encourage** use of chest X-rays.
- **Improve Model** using in-house X-rays.
- **Create New Model** for bacterial vs viral pneumonia cases.

Thank you!

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