Pulmonary Radiograph Screenings

Improving Efficiency & Accuracy in Healthcare Diagnosis

Pulmonary Diagnosis

- In one study, a false-negative rate of 11.4% was reported when chest x-ray was used to diagnose pneumonia, which is the gold standard of diagnosis. (1)

- Pneumonia is considered one of the more severe associations with COVID-19 cases, more severe cases representing about 15% of diagnoses.

- Pneumonia is responsible for 15.1 out of 100,000 in the US (2)

Radiograph Identification - Can you tell?

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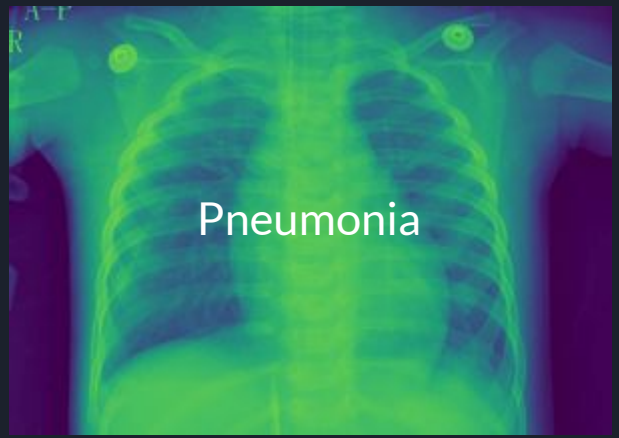
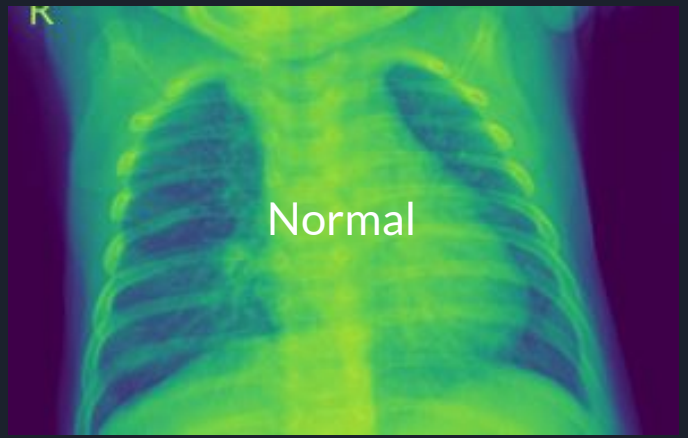




Our Proposal

- Create a model that would take patient x-rays and detect pneumonia if present
- Create a model that is trustworthy and reliable
- Create a model that could be used to inform similar projects in the future

Dataset

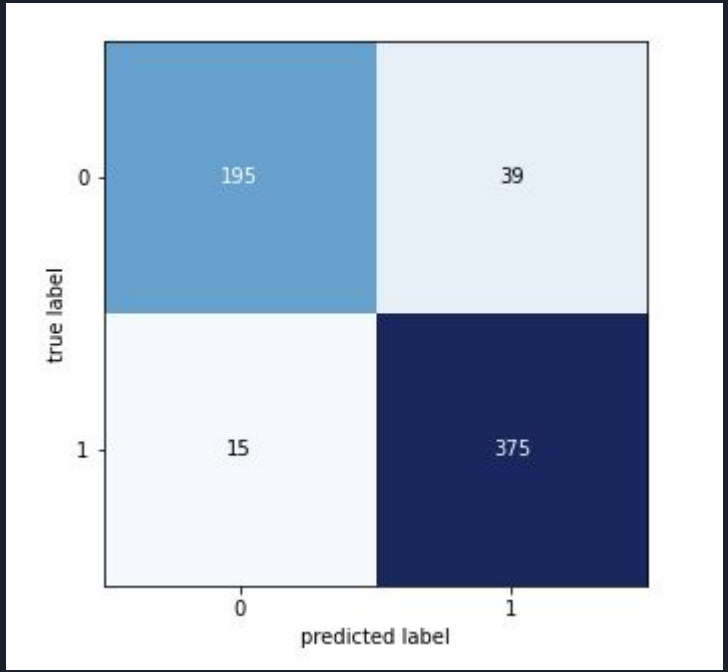
- The data set was described as follows:

  Chest X-ray images (anterior-posterior) were selected from retrospective cohorts of pediatric patients of one to five years old from Guangzhou Women and Children's Medical Center, Guangzhou. All chest X-ray imaging was performed as part of patients' routine clinical care.

- NOTE: These are pediatric radiographs. This is a limitation of the study as diagnosis of pediatric disease process often deviates from adults. Although we feel this algorithm could be expanded to adults, it would be best to train the model on adult images.

Our Model

- Accuracy: 91 %
- Specificity: 83%
- Sensitivity: 96%



Conclusions

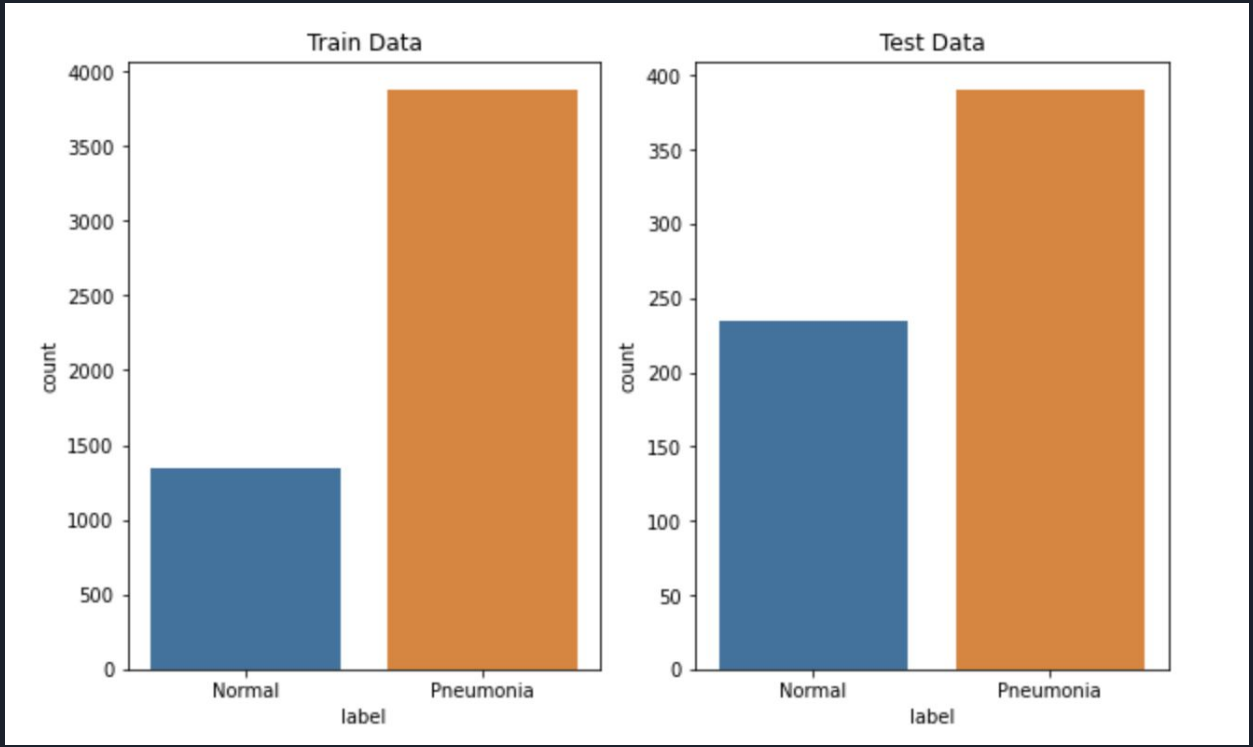
- With such excellent performance measures, we feel confident that this model can be reliably used to detect pneumonia in pediatric populations. This model mitigates the chance of missing a pneumonia case by 9% which could drastically change patient outcomes. Additionally this will give practitioners quicker and more accurate results which will improve patient care.

Further Recommendations

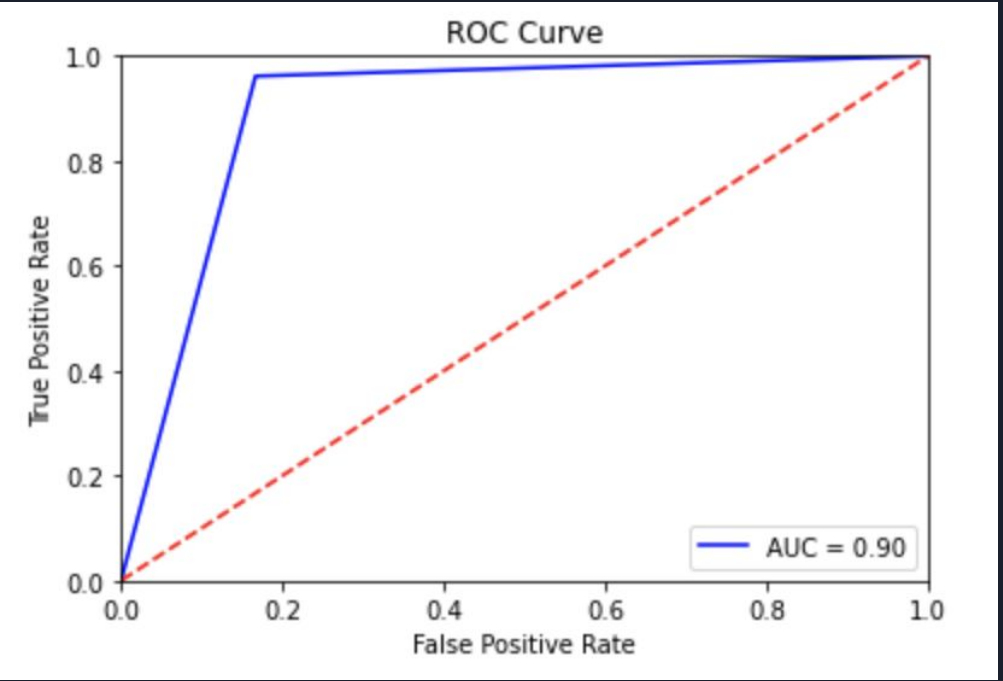
- Repeat this model with adult images
- Repeat this study with another set of pediatric images to ensure repeatability
- Repeat this model with other imaging protocols to continue streamlining and improving efficacy of diagnosis and treatment standards.

Thank You

Appendix 1: Class Breakdown



Appendix 2: ROC curve



References

1. Maughan BC, Asselin N, Carey JL, Sucov A, Valente JH. False-negative chest radiographs in emergency department diagnosis of pneumonia. R I Med J (2013). 2014;97(8):20-23. Published 2014 Aug 1.
2. National Vital Statistics Reports, Vol. 68, No. 9, June 24, 2019