Pneumonia Detection

Cristopher Delgado

Agenda

Business Understanding

Data Understanding

Results

Evaluation

Business Understanding:

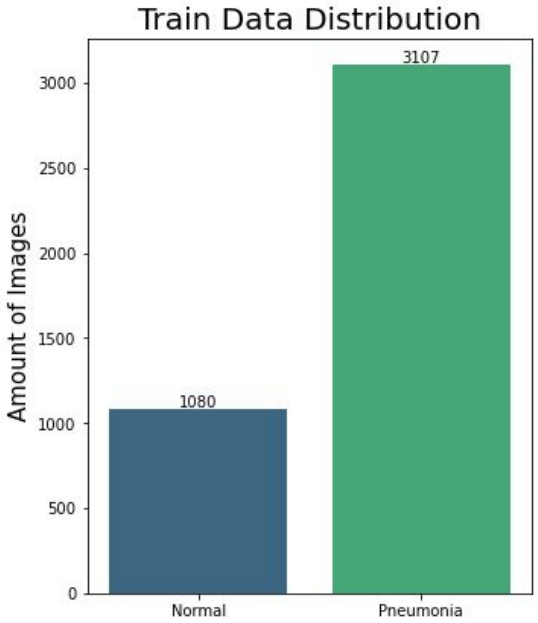
Current Issues:

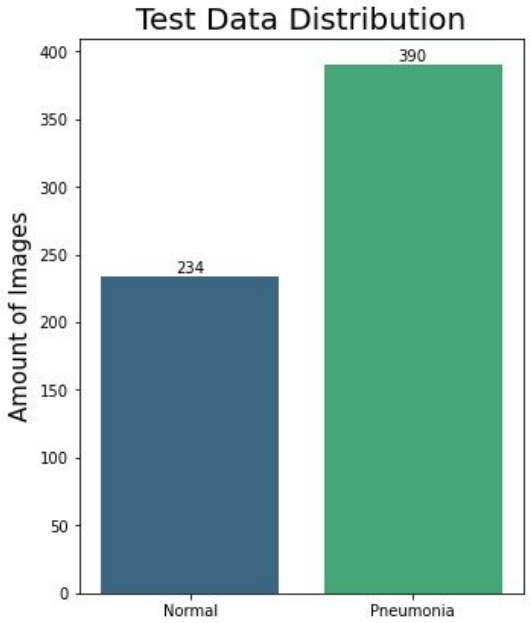
- Medical Imaging Interpretation
- Point of Care Diagnostics, Clinical Diagnostics
- Pixel Radiology
- Generates Reports and information. Does not suggests possible conditions.

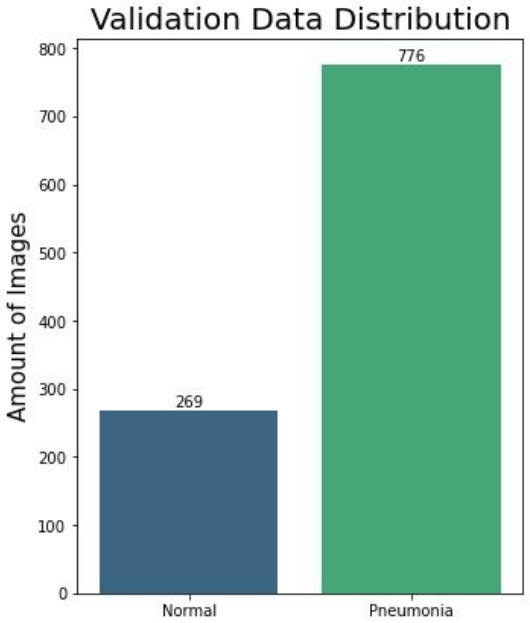
Why it is important:

- Computer Aided System (CAS) provide diagnostic information.
- Transition from information to suggestions

Data Understanding

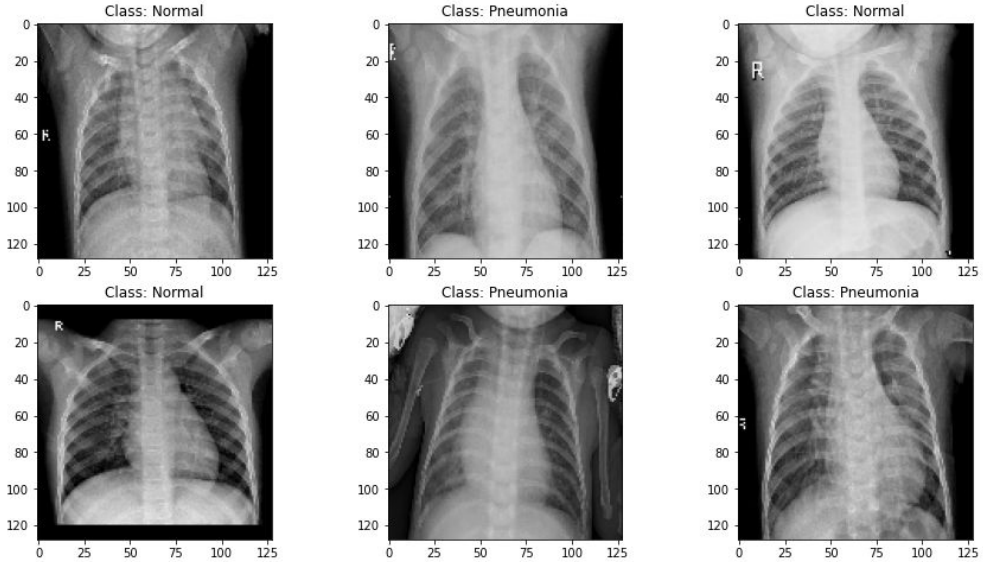






Data Preparation

- Data Generators to Label and produce the following:
  - Normalization
  - Resize Images
  - Grayscale -> RGB
  - Label Images



Results

Test Set/Unknown Data

Model	Precision/Specificity	Recall/Sensitivity
Convolutional Architecture V3	71.85%	99.48%
Convolutional Architecture V3 Augmented	88.43%	94.10%
VGG19 Transfer Learning Feature Extraction	75.24%	100.00%

Evaluation

- Implement the Augmented Convolutional Neural Network into the existing Pixel for Radiology
  - Model complexity is simple
  - Integration will have small to no impact for existing users
  - Good generalization to unknown data
- Outperforms in Specificity, equally performs in Sensitivity

Thank you

Questions?

All Models

Model	Train Precision/Specificity	Validation Precision/Specificity	Test Precision/Specificity	Train Recall/Sensitivity	Validation Recall/Sensitivity	Test Recall/Sensitivity	Training Time (HH:MM:SS)
MLP Base	96.98%	95.56%	73.09%	97.23%	97.16%	98.20%	00:11:32
MLP Version 7	99.25%	96.42%	73.75%	98.26%	97.29%	98.71%	00:16:56
MLP Augmented	84.61%	83.77%	67.52%	91.34%	89.81%	94.35%	00:21:19
CNN Base	99.42%	96.36%	70.72%	99.32%	98.96%	99.74%	00:10:44
CNN Version 3	100.00%	98.56%	71.85%	100.00%	97.68%	99.48%	00:10:44
CNN Augmented	98.64%	98.85%	88.43%	88.79%	89.04%	94.10%	00:23:11
VGG19	99.96%	98.32%	75.24%	100.00%	100.00%	100.00%	00:00:19