PNEUMONIA X-RAY ANALYSIS

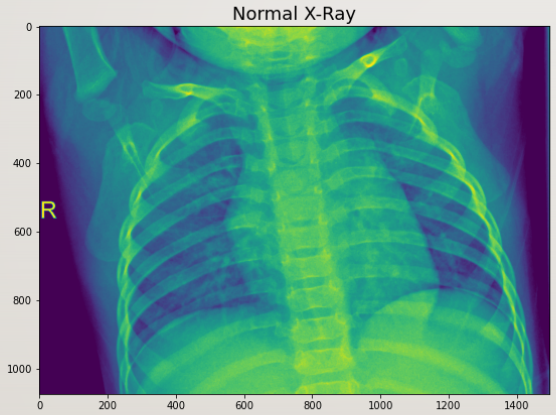
MARINA SAITO

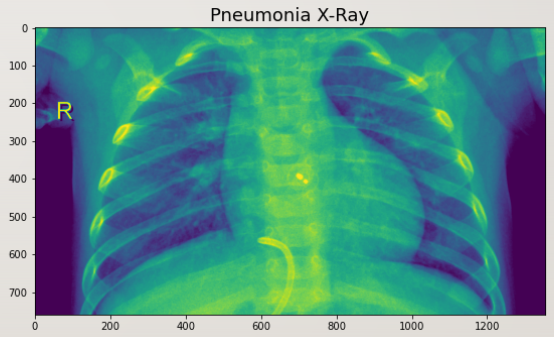
OCTOBER 24, 2021

BUSINESS PROBLEM

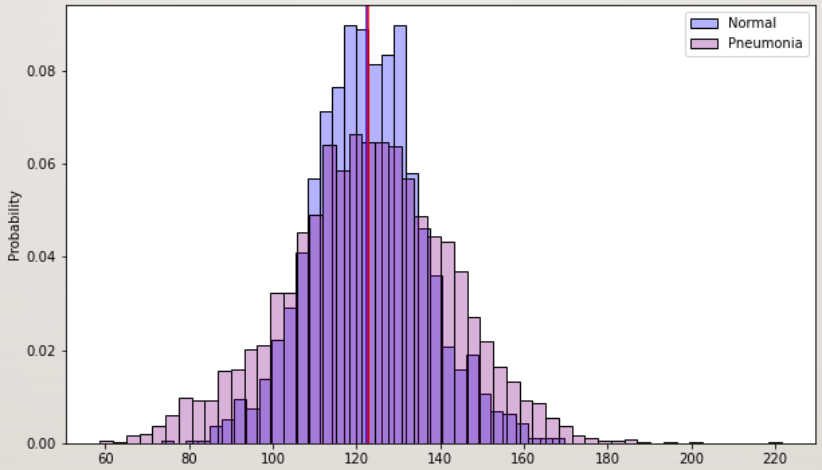
- Compare X-Rays of Pediatric Patients with Pneumonia vs. Normal Patients
- Build a Model to Accurately Classify X-Rays of Patients with Pneumonia
- Important to Minimize False Negatives
- Focus on Recall Score

DATA – PEDIATRIC X-RAYS





DATA – BRIGHTNESS DISTRIBUTION



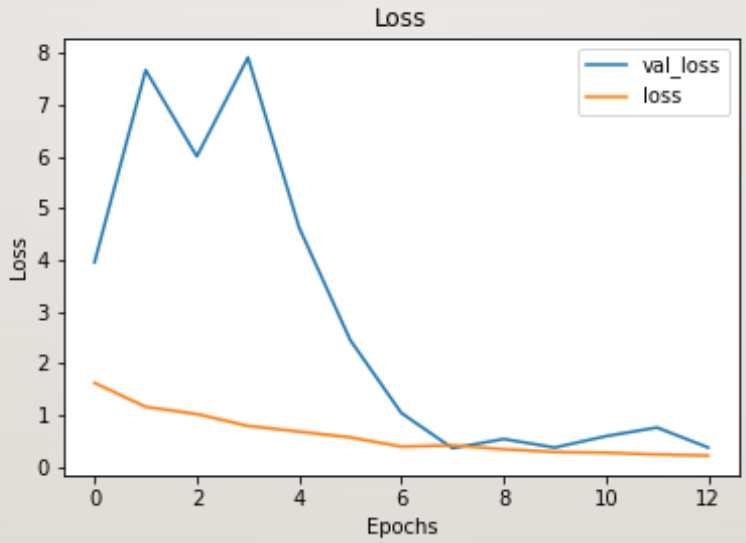
METHODS – DATA AUGMENTATION

- Rotate +/- 30°
- Zoom in and out
- Shift left and right
- Shift up and down
- Horizontal flip

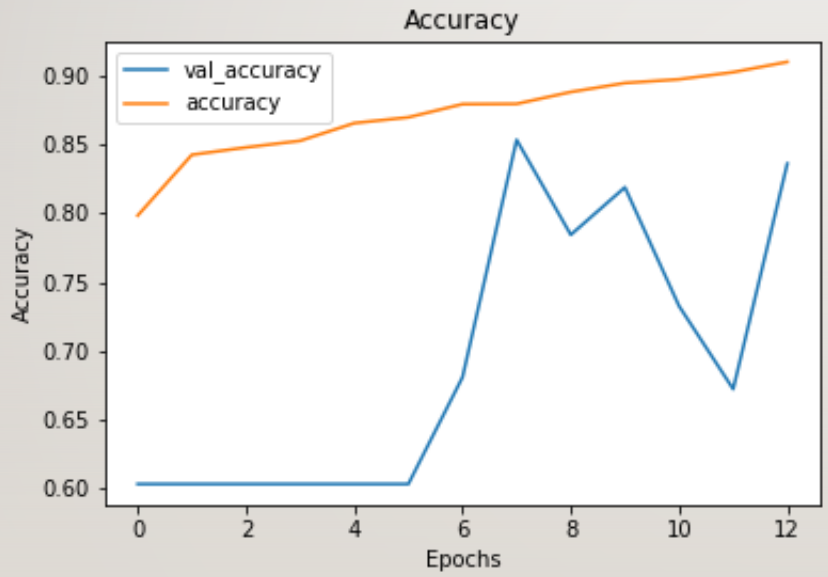
METHODS – MODEL DEVELOPMENT

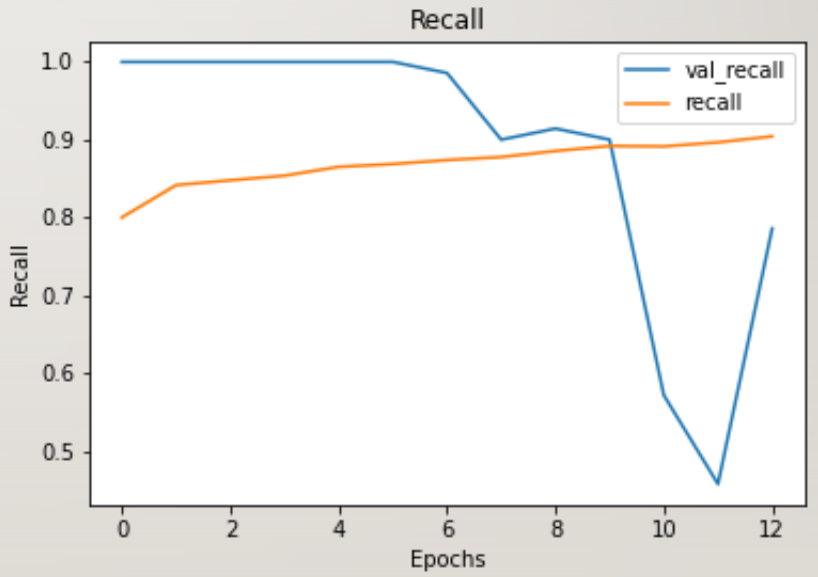
- Started with simple models
- Tried classic architectures on images to determine basic structure for model
- Selected LeNet5 model
  - Replaced outdated steps with current version
  - Added dropouts to decrease overfitting
  - Some of the models were simply predicting that all images were pneumonia patients, so replaced Relu activation function with leaky relu

METHODS – MODEL DEVELOPMENT

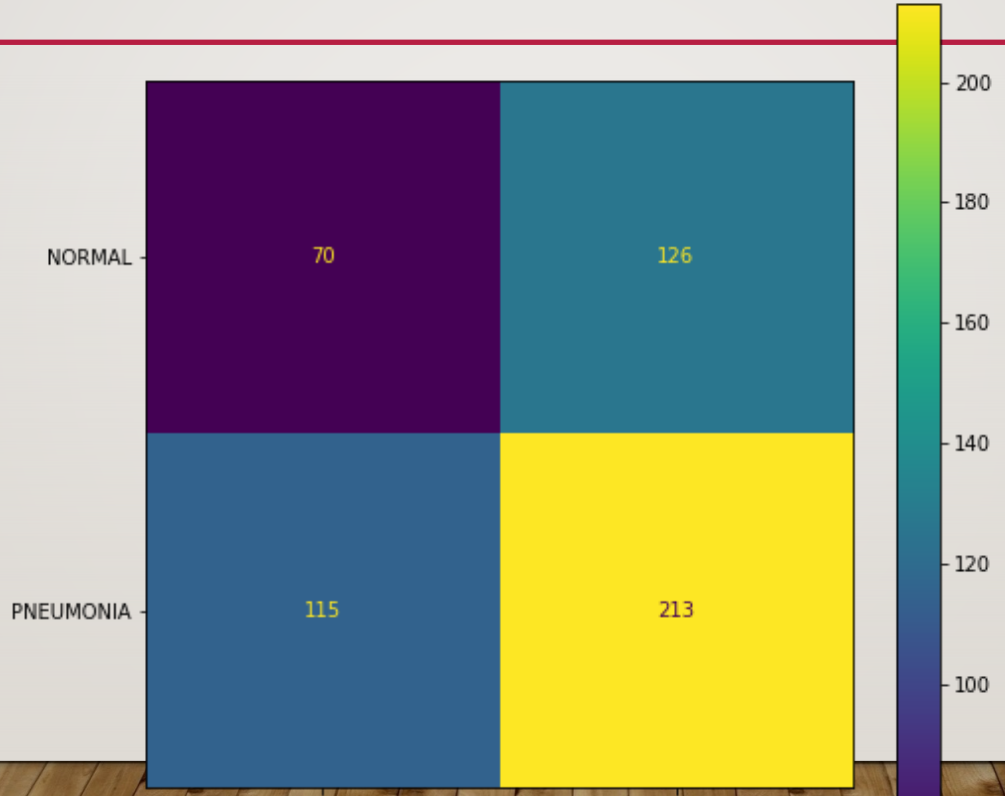


METHODS – MODEL DEVELOPMENT



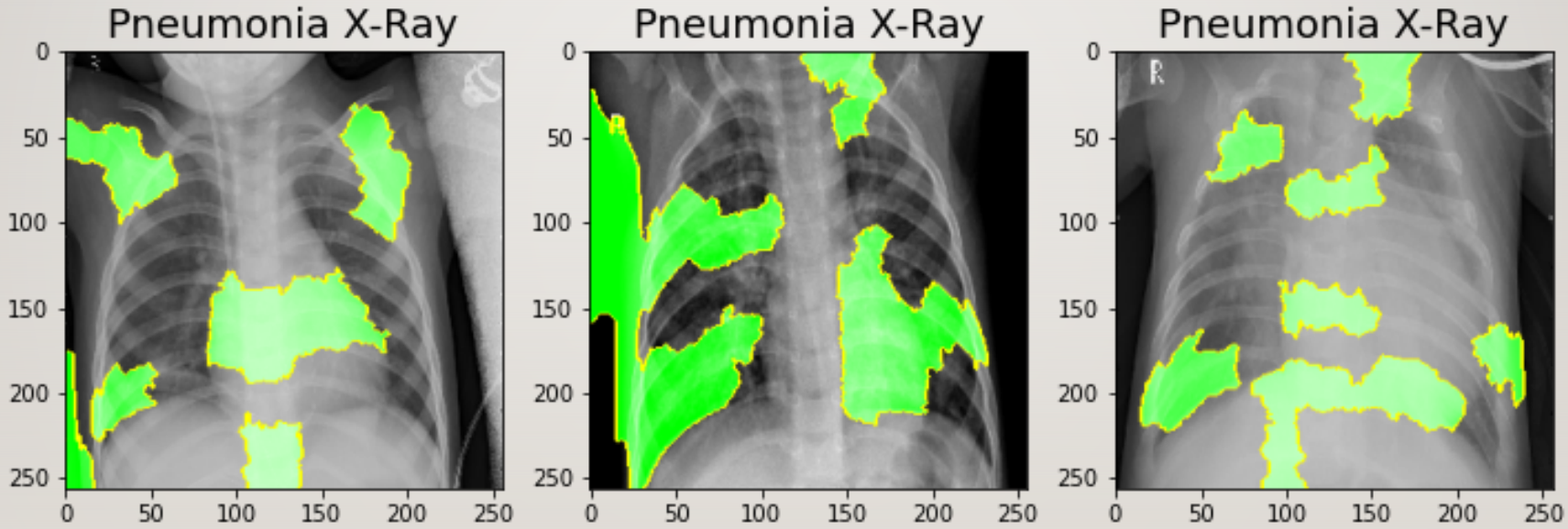


RESULTS – CONFUSION MATRIX

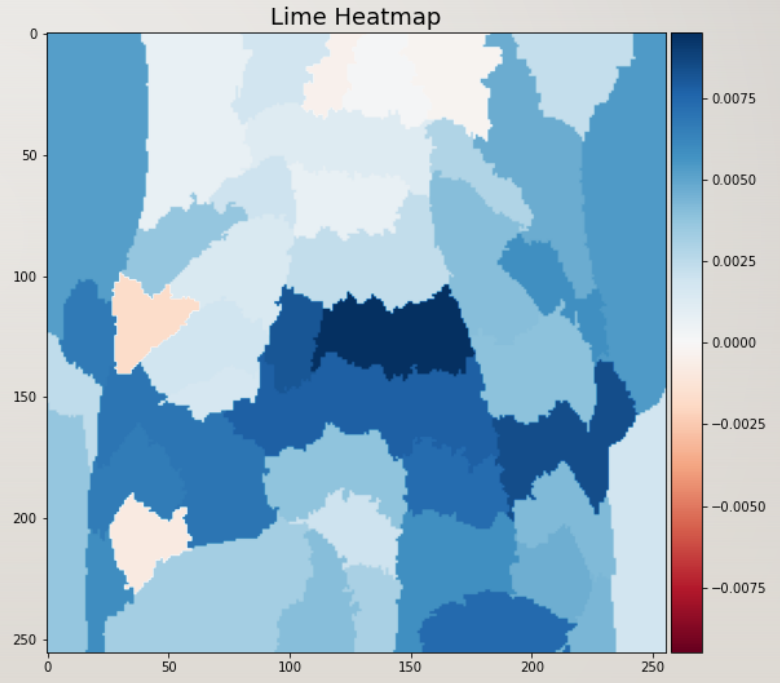


Model Classified Test Data
With 54% Accuracy,
65% Recall

RESULTS – FEATURE IMPORTANCE



RESULTS – FEATURE IMPORTANCE



CONCLUSIONS

- Created a model that classifies pneumonia in pediatric x-rays
- Model does not perform very well
  - 54% accuracy
  - Recall of 65%
  - Model is not focusing on lungs to classify images

NEXT STEPS

- Continue to adjust parameters on model to better classify pneumonia in pediatric x-rays
  - Improve accuracy
  - Improve recall (minimize false negatives)
  - Improve features model focuses on

Thank You!

Email: saito.mn@gmail.com

GitHub: @mnsaito

LinkedIn: https://www.linkedin.com/in/marina-saito-7478135/