Identifying Pneumonia Through Deep Learning

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Problem Overview

False pneumonia diagnoses and failing to diagnose pneumonia has consequences

A patient with pneumonia left without treatment

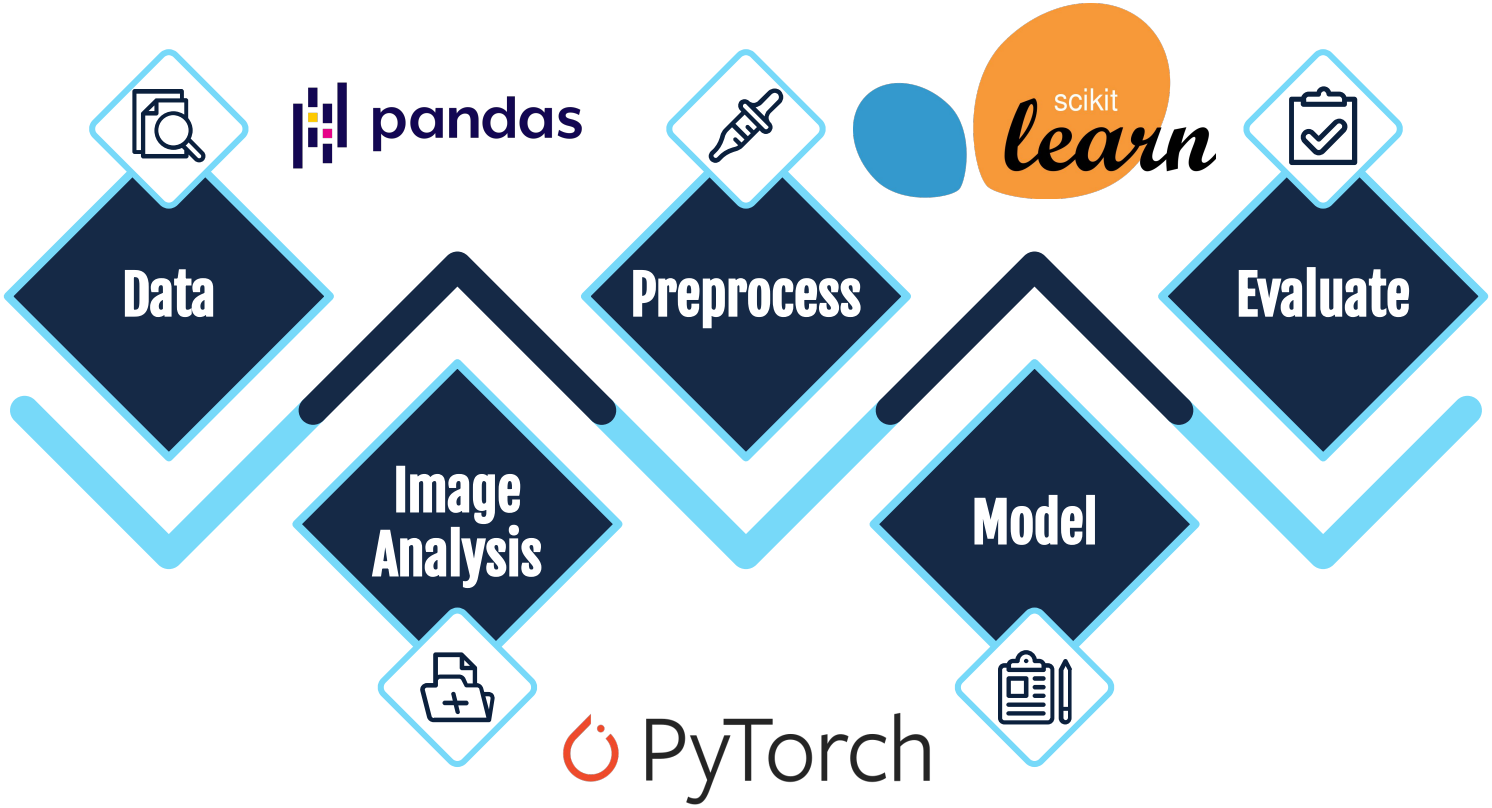
False Negative Diagnosis

A patient given unnecessary treatments, like antibiotics

False Positive Diagnosis

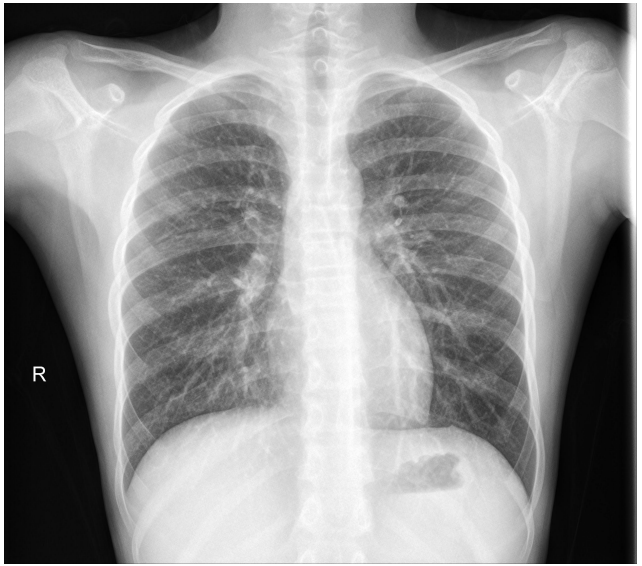
SOLUTION: Implementing a deep-learning model

Methods


pandas
scikit learn
Data
Preprocess
Evaluate
Image Analysis
Model
PyTorch

Data

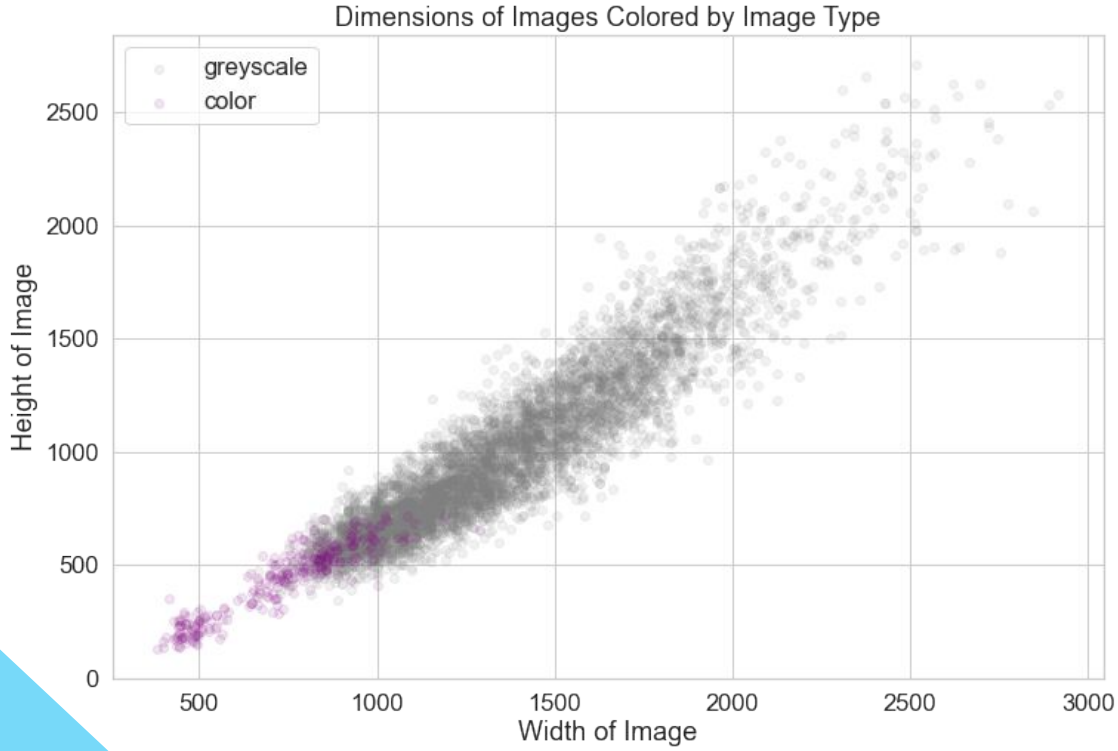
Healthy



Sick

Over 5,000 similar images obtained from Kaggle

Data



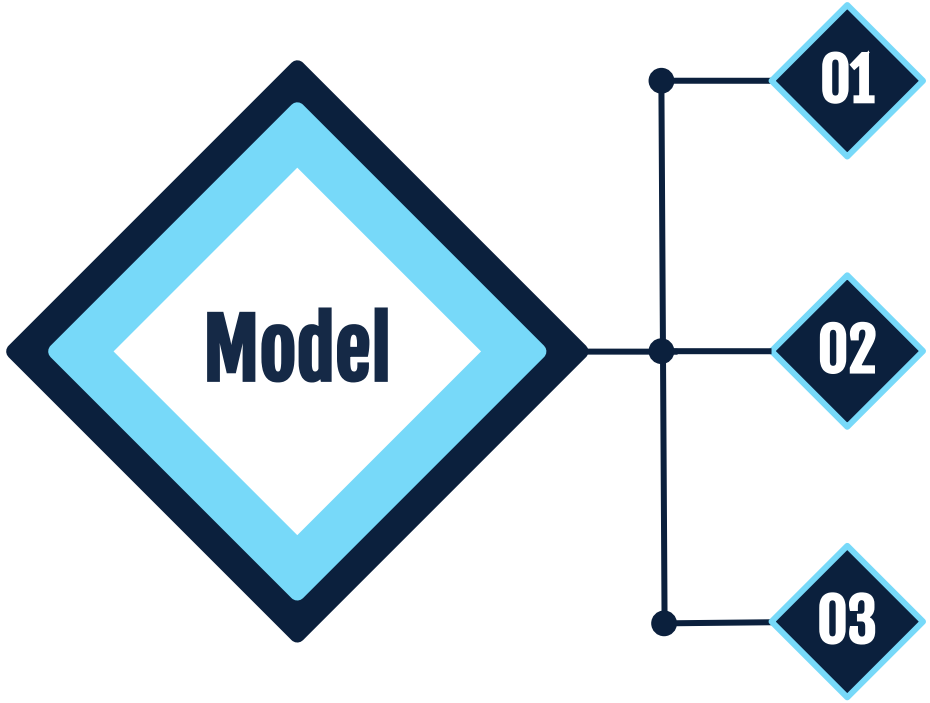
Issues

- Different colors
- Different sizes
- Different exposures

Solutions

- Converting to greyscale
- Resizing to very small image
- Normalizing

Modeling



Model Design

- Linear > ReLU
- Linear > Sigmoid

Optimization

- Adam with L2
- BCE

Interpretation

- Threshold 0.9

Model Performance

91%

Recall (Test)

100%

Prediction on Holdout

87%

F1 (Test)

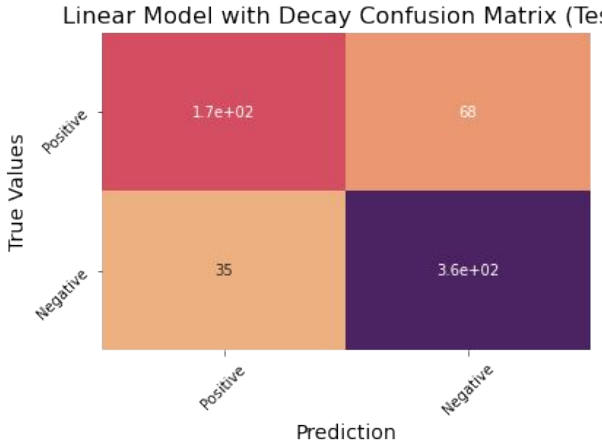
Model Performance

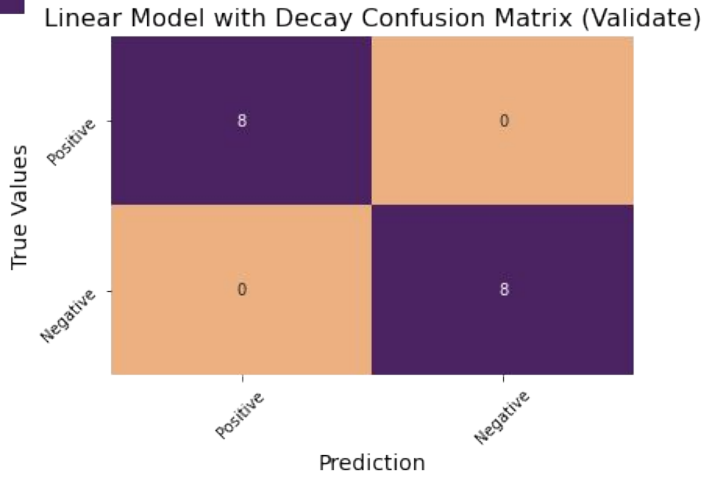
Regularization

L2 regularization Adam

Threshold

Prediction @ 0.9 or higher





Conclusion

Doctors

Supplementary diagnosis tools for edge cases

Labs and Specialists

Fast and efficient boost on x-ray analysis

Patients

Accurate diagnosis with very little financial impact

Future Works

Class Imbalance

Upsample minority through image manipulation

Less Compression

Utilize larger CUDA environment

Complexity

Decrease data processing and upscale model

Thanks

Do you have any questions?

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