Medical Imaging and Machine Learning

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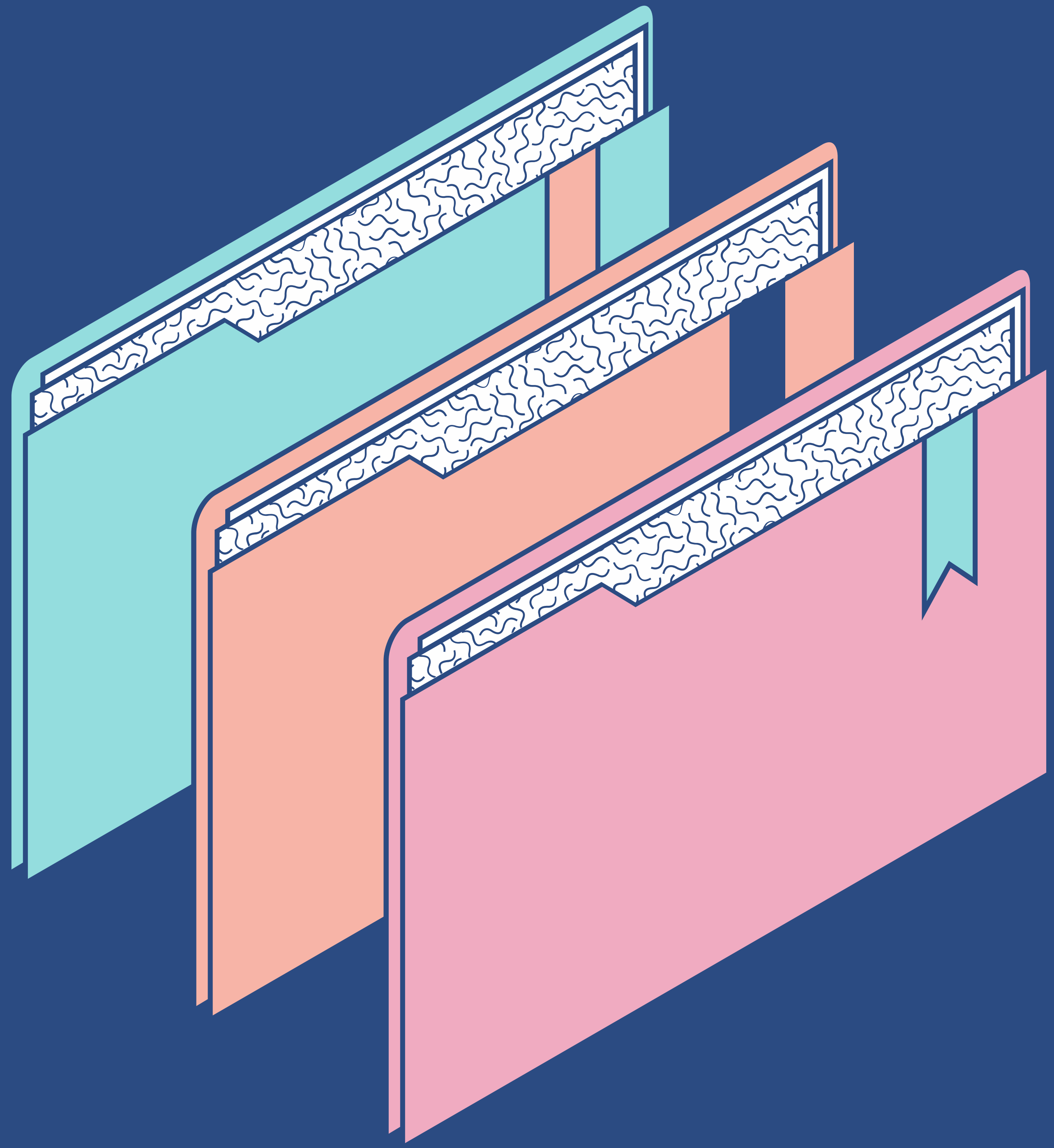
CONTENT



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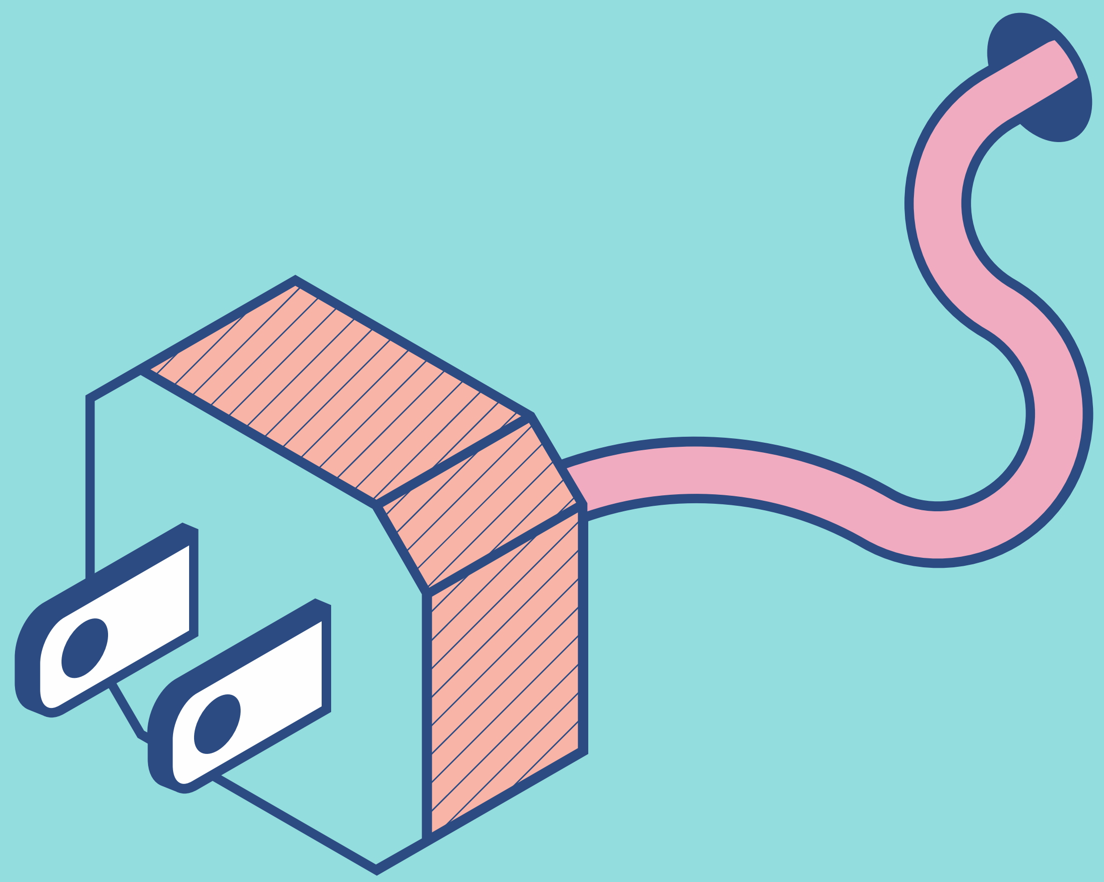
Artificial Intelligence in Biomedical Imaging

Medical imaging provides a number of features derived from different types of analysis, including artificial intelligence. These features are most often used for a variety of analyses including classification, evolutionary calculations, image segmentation. Medical diagnostics can be aided by proper image processing, feature selection, and artificial intelligence methods.

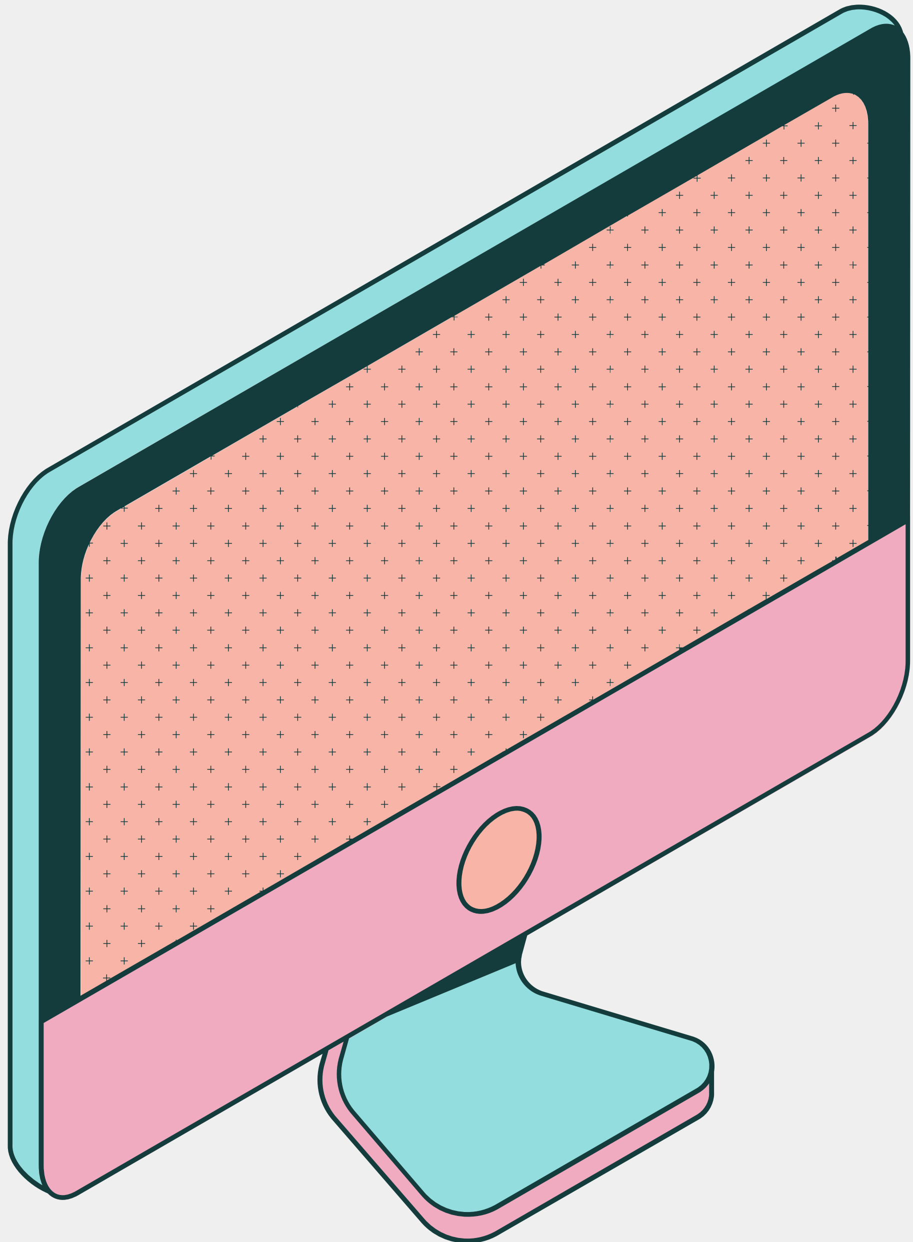


Lung Segmentation of X-Ray Images

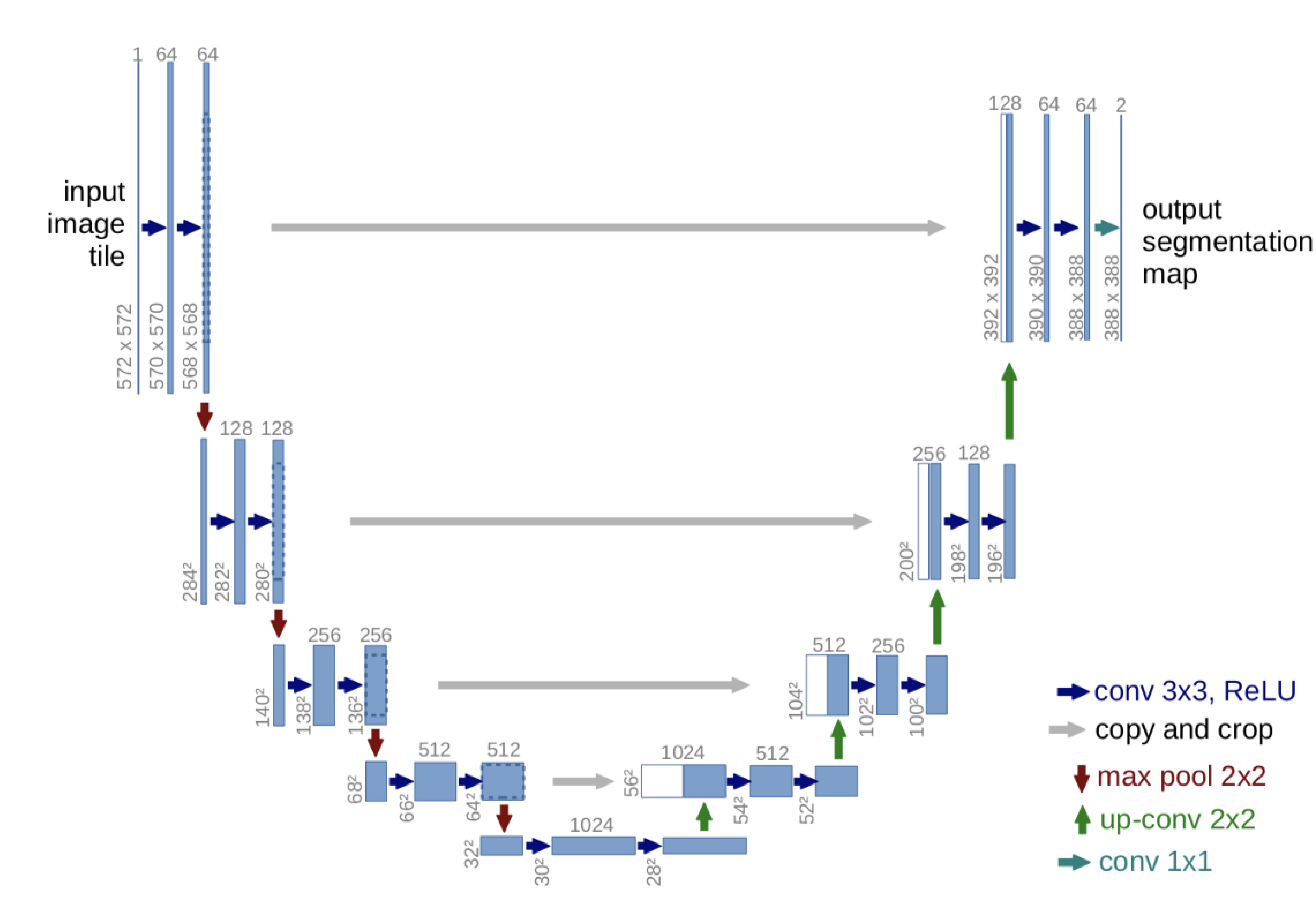
Pixel Wise Image Segmentation of Chest X-Ray Images for Pulmonary Defect Detection.

Tech Stack:

1. Python Programming Language
2. TensorFlow Library
3. UNET Model

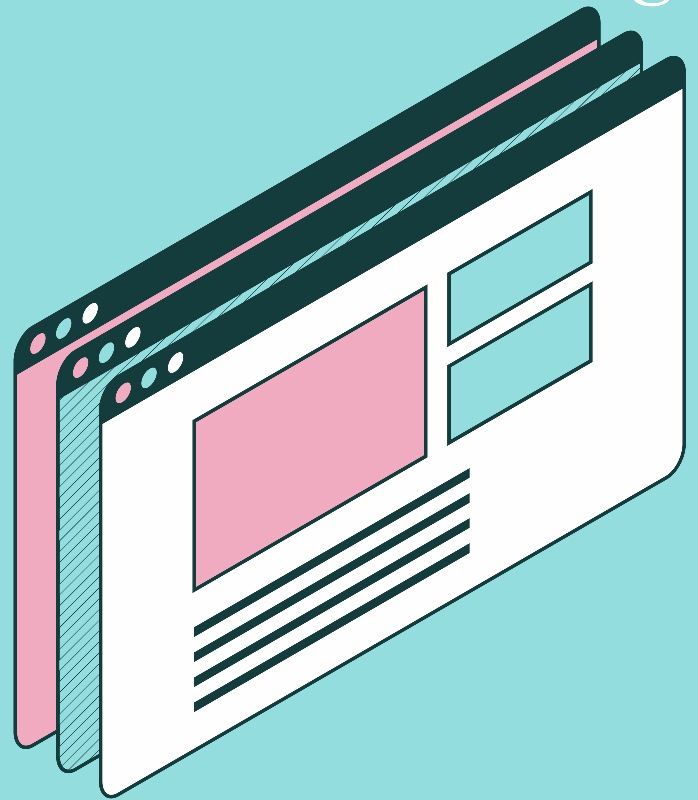


UNET Architecture



Approach for Lung Segmentation

1. Data Extraction and Data Pre-Processing
2. Train/Validation/Test Split
3. Defining Convolution Blocks and CNN Layers
4. Training the model and saving the best seen model during the training
5. Evaluation and Prediction on Test Data-Set

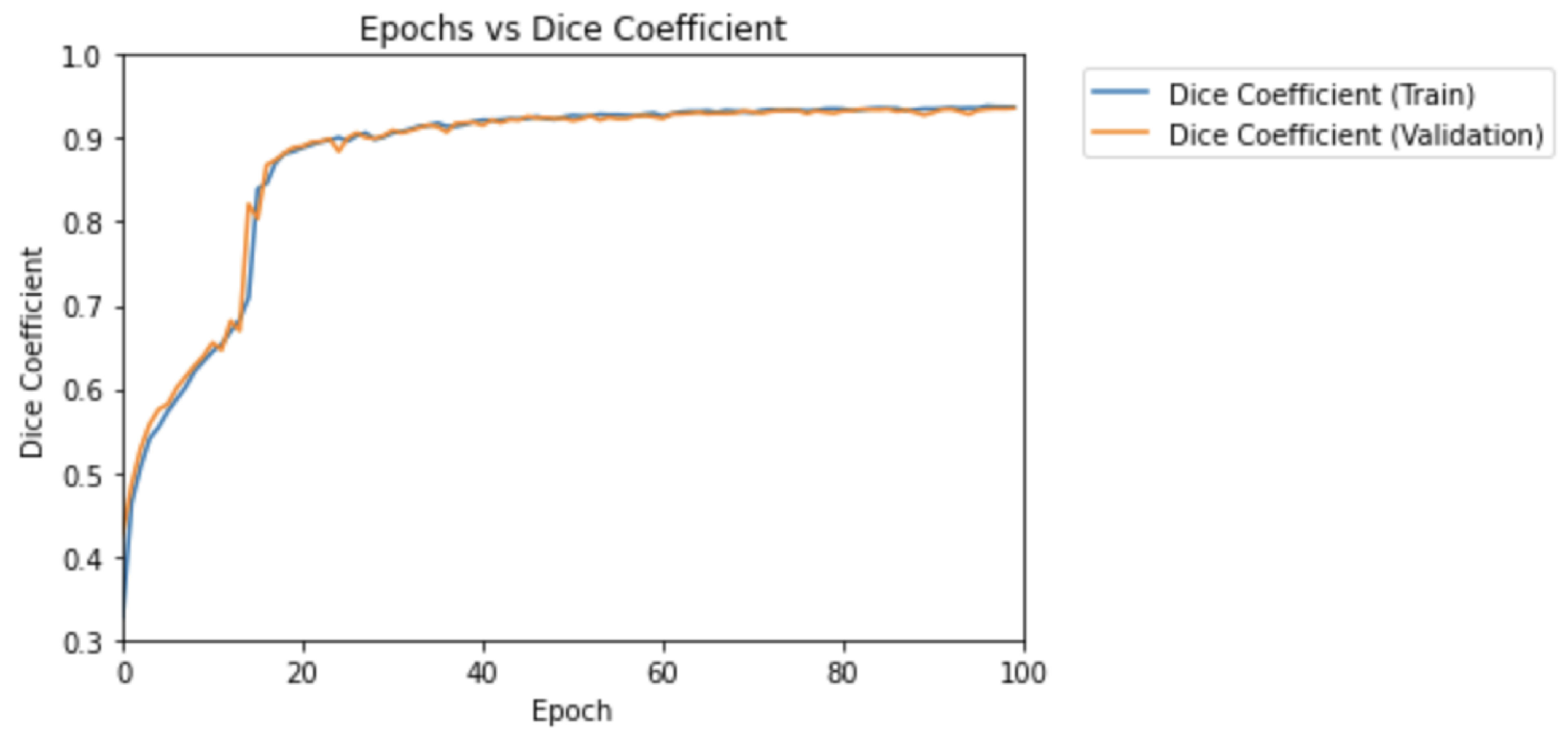


Dice Coefficient

$$DSC = \frac{2TP}{2TP + FP + FN}$$

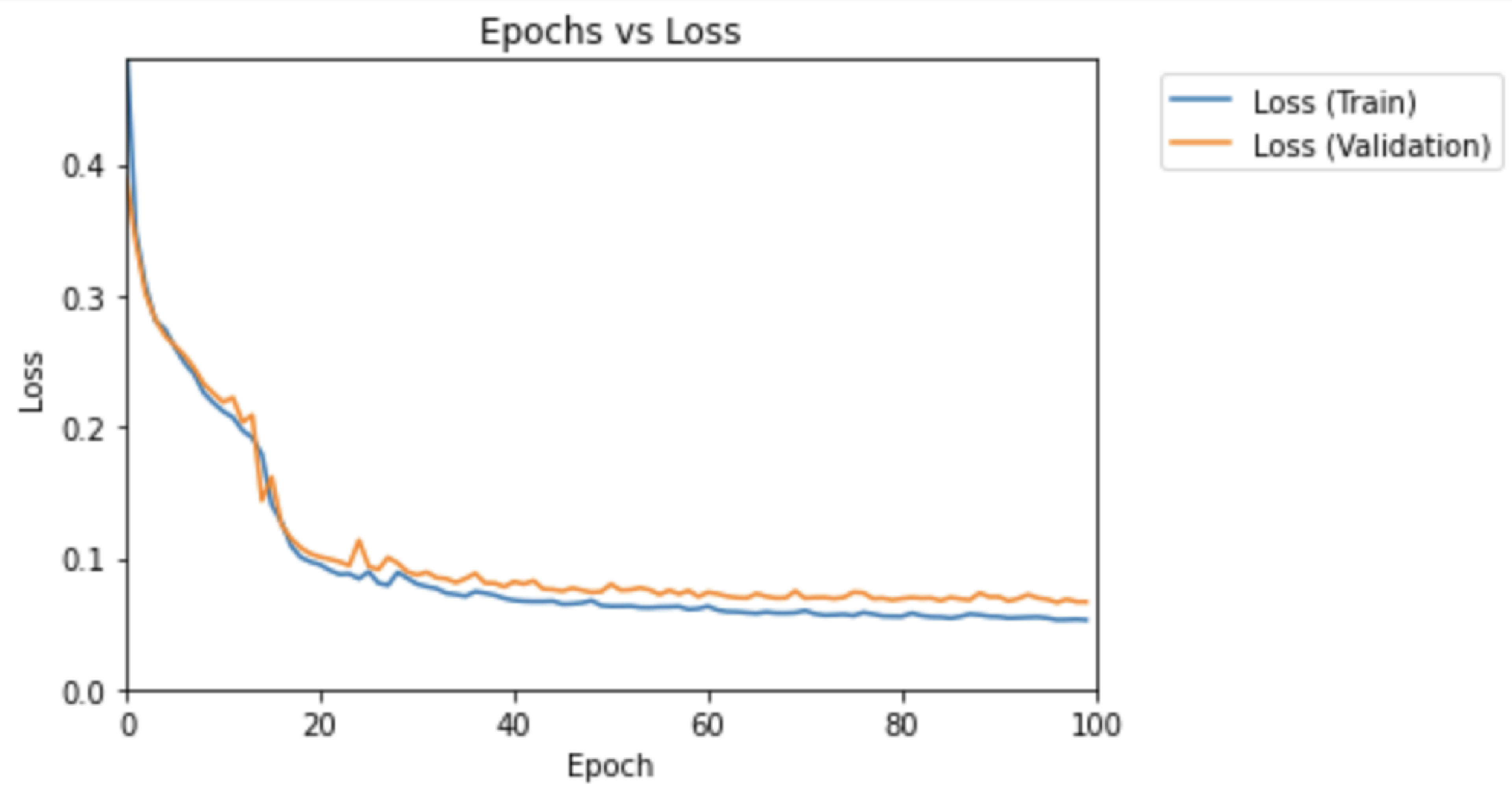
TP = True Positive
FP = False Positive
FN = False Negative

Results after Training the UNET model



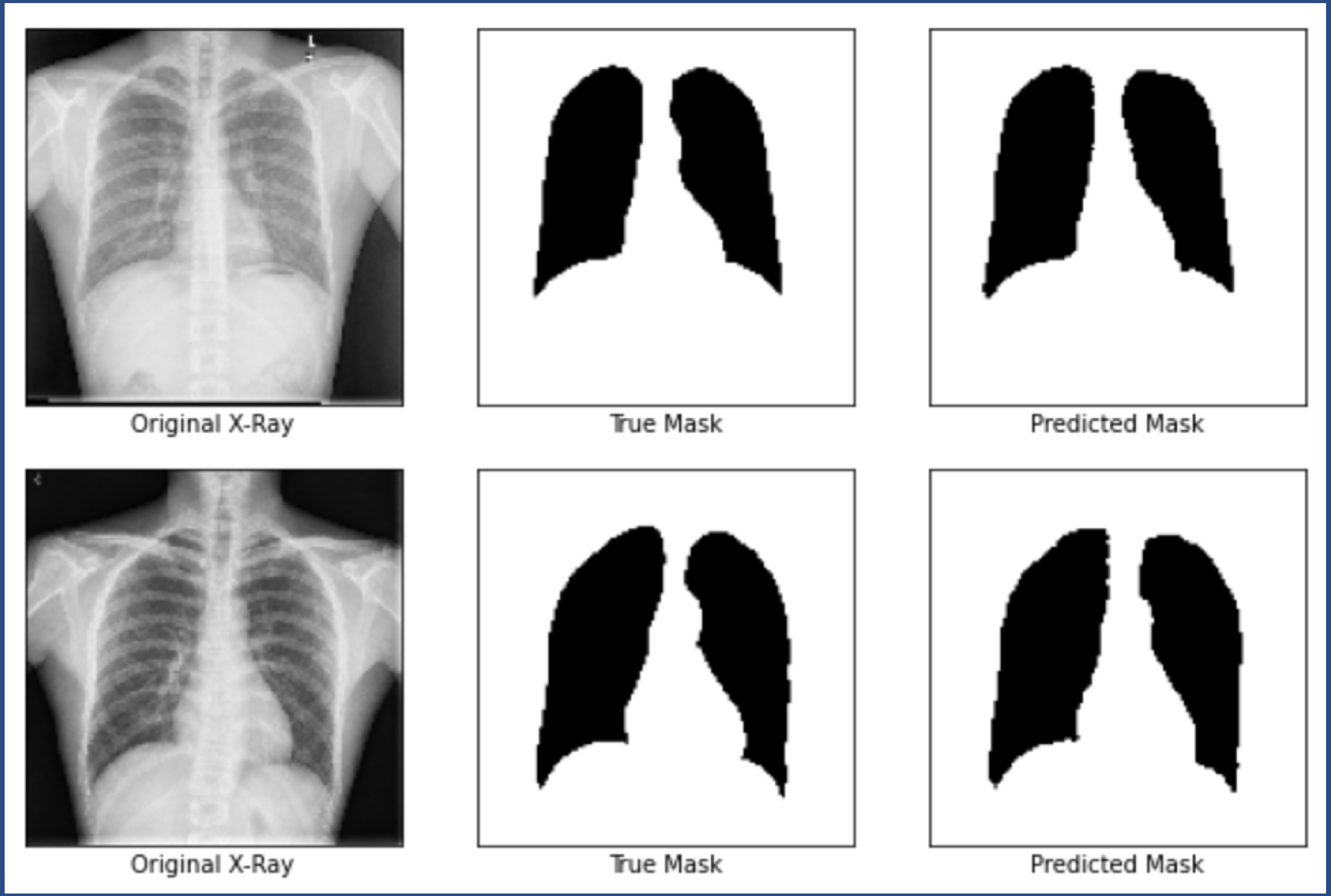
Epochs VS Dice Coefficient

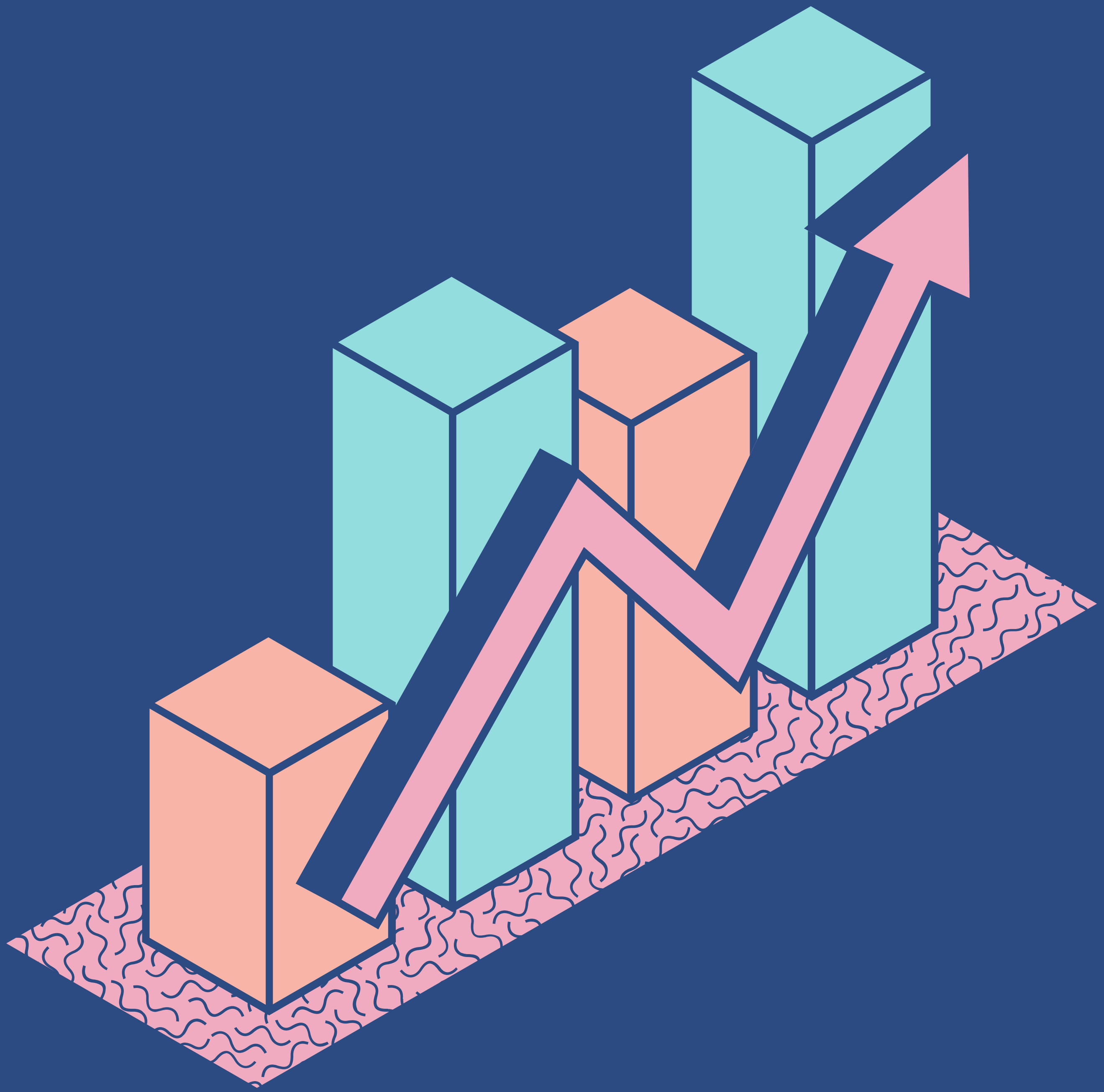
Epochs VS Loss



Evaluation and Prediction on Test Data

Dice Coefficient of model on Test Data-Set = 94.05 %





Edge Detection on X-Ray Images

Edges Detection of Chest X-Ray Images using Canny Edge Detection Method

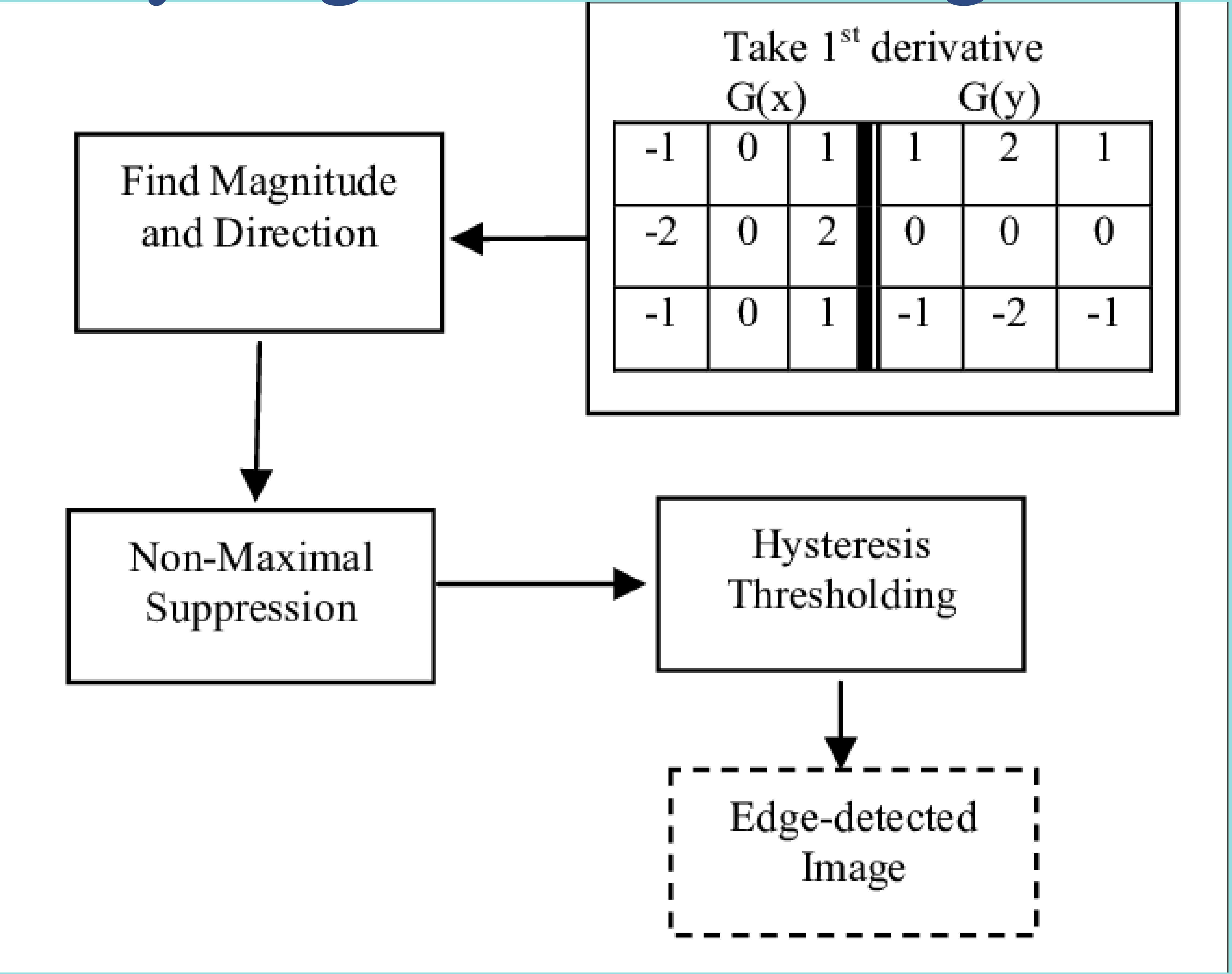
Tech Stack:

1. Python Programming Language
2. OpenCV Library

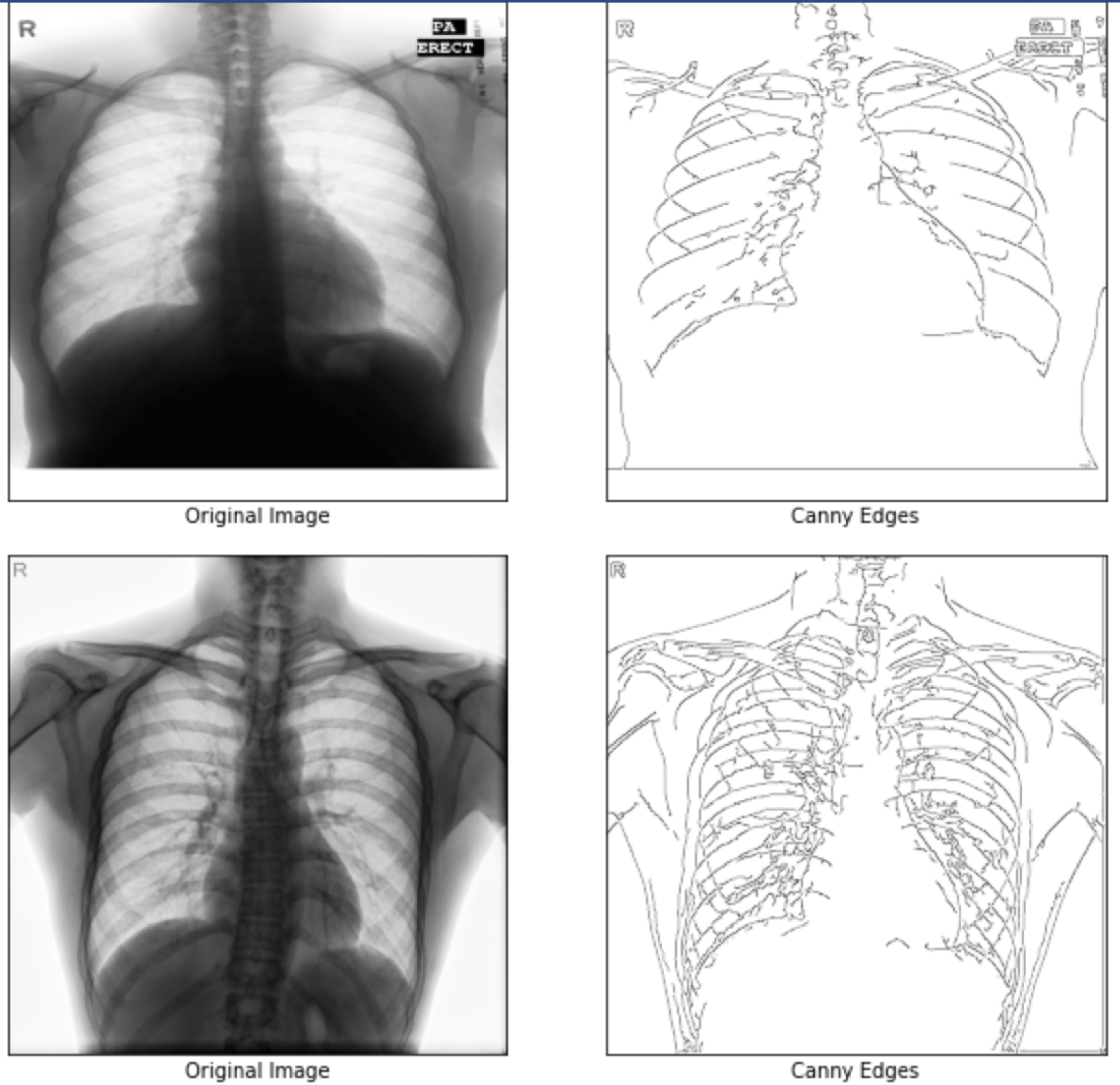
Approach for Edge Detection

1. Finding Optimal Threshold values using Track-bar
2. Finding Optimal Kernel Size using Track-Bar
3. Data Extraction and Resizing the Image to 512x512
4. Gaussian Blur
5. Canny Edge Detection

Canny Edge Detection Algorithm



Results after Edge Detection



What I have learned?

- How to Build an End-to-End Convolution Neural Network
- How to Calculate Dice Coefficient
- Difference Between Mean IoU and Dice Coefficient.
- How to Detect Edges using Canny Edge Detection
- Different Edge Detection Techniques like Laplacian, Sobel, Canny and their differences.
- How to use TensorFlow and OpenCV Library

Link to GitHub Repository:
https://github.com/tipsi2022/Medical_Imaging_and_Machine_Learning-SRI

Link to Dataset:
https://www.kaggle.com/nikhilpandey360/chest-xray-masks-and-labels

THANK YOU !!