

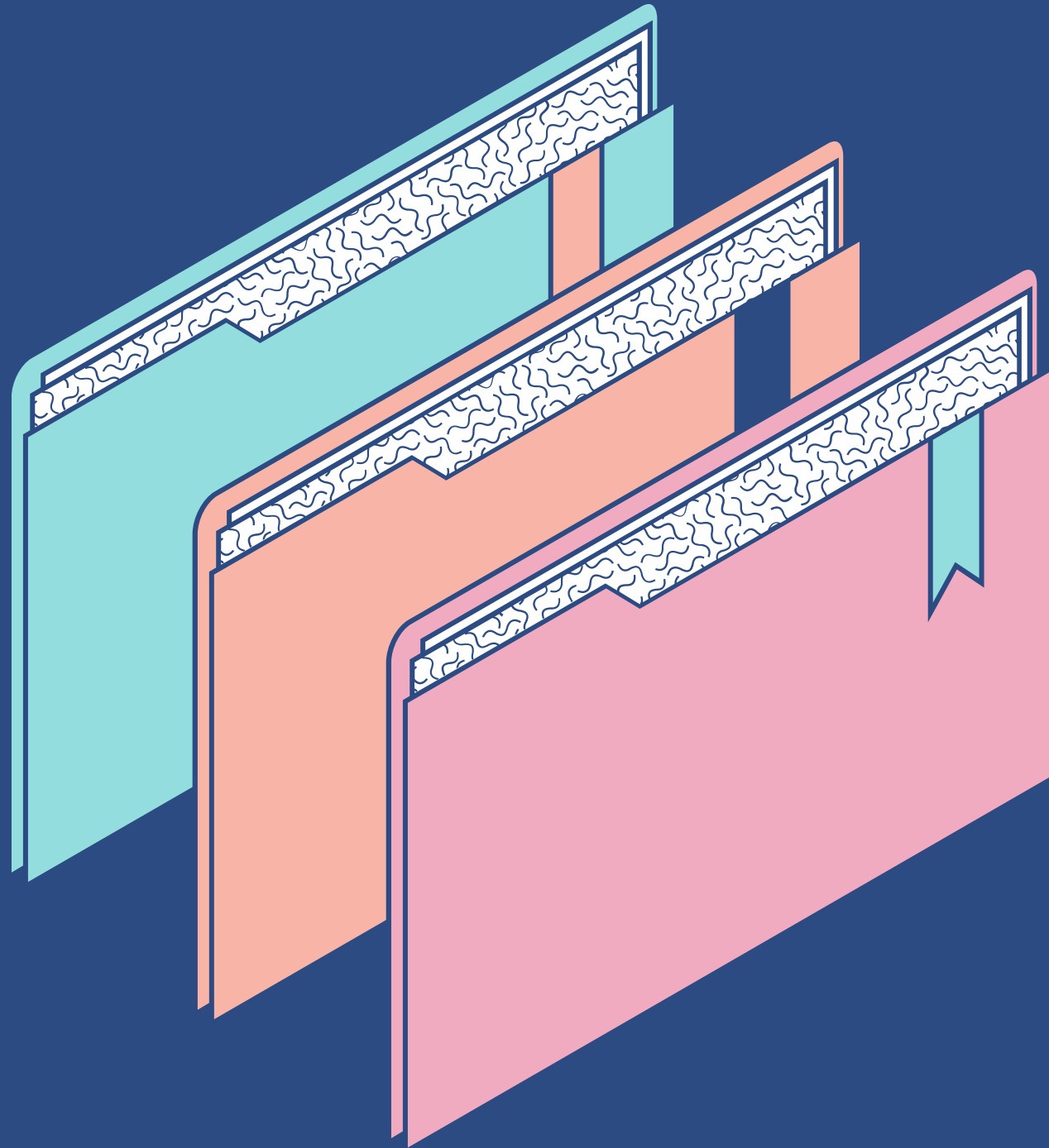
A stylized illustration of a desk setup. In the center is an open laptop with a teal screen and a dark keyboard. To the left of the laptop is a stack of three books in teal, orange, and teal. Below the books is a potted plant with long, pointed leaves in teal and orange, sitting in a pink and orange pot. To the right of the laptop is a teal pen holder with a pink base, containing three pens in orange, teal, and orange. Above the laptop is a teal folder or book with a white border and a pattern of small white crosses. The entire scene is set against a dark blue background.

# Medical Imaging and Machine Learning

Mentor: Professor Bakul Gohel

By: Tipsi Jadav  
ID: 201801091

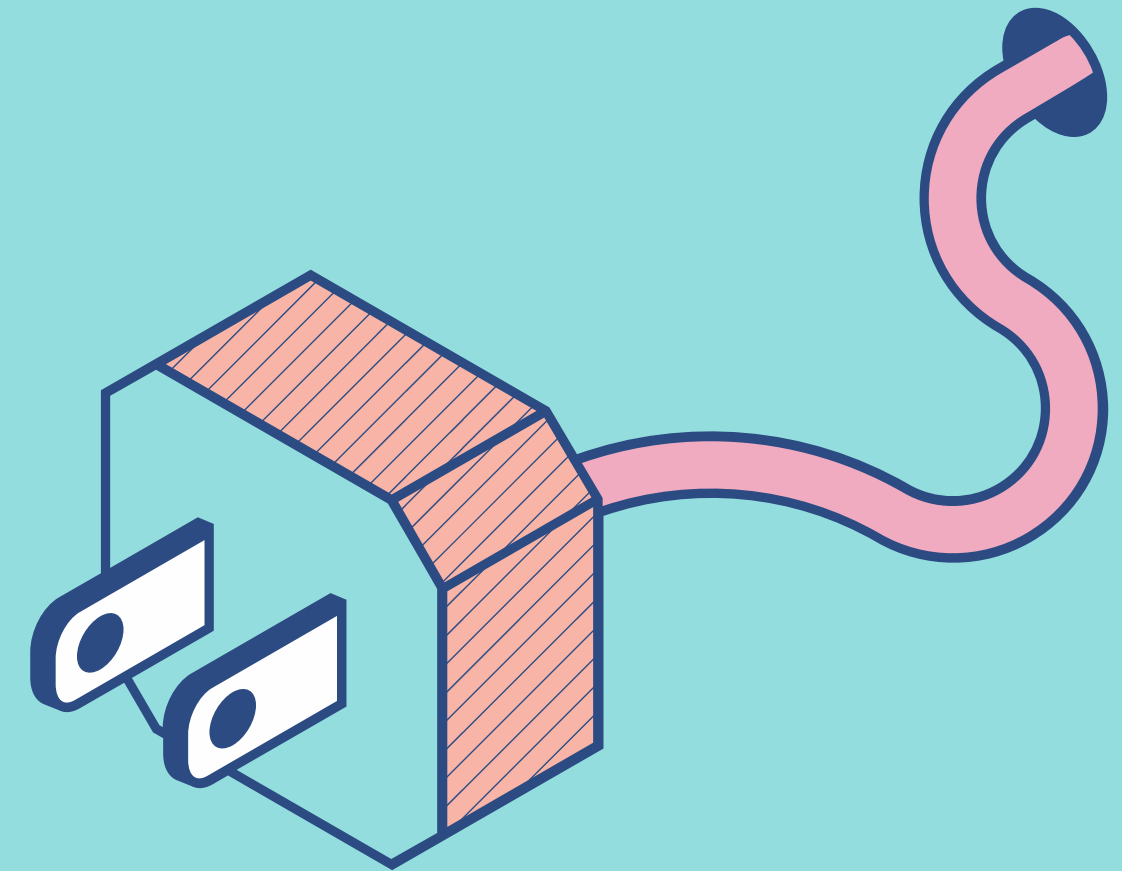
# CONTENT

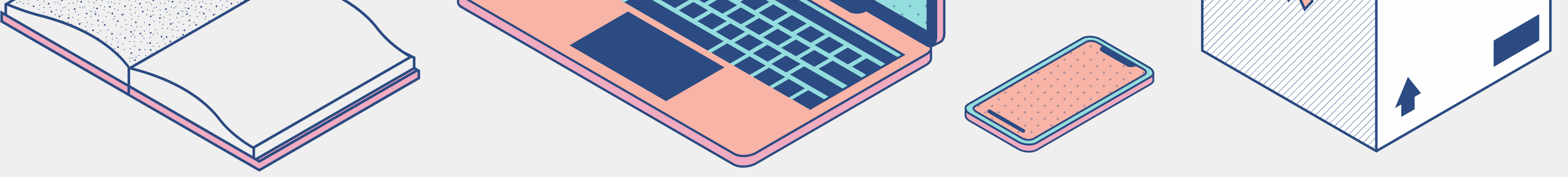


1. Artificial Intelligence in Biomedical Imaging
2. Lung Segmentation of X-Ray Images
3. UNET Architecture
4. Approach for Lung Segmentation
5. Dice Coefficient
6. Results after Training the UNET model
7. Evaluation and Prediction on Test Data
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# Artificial 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.



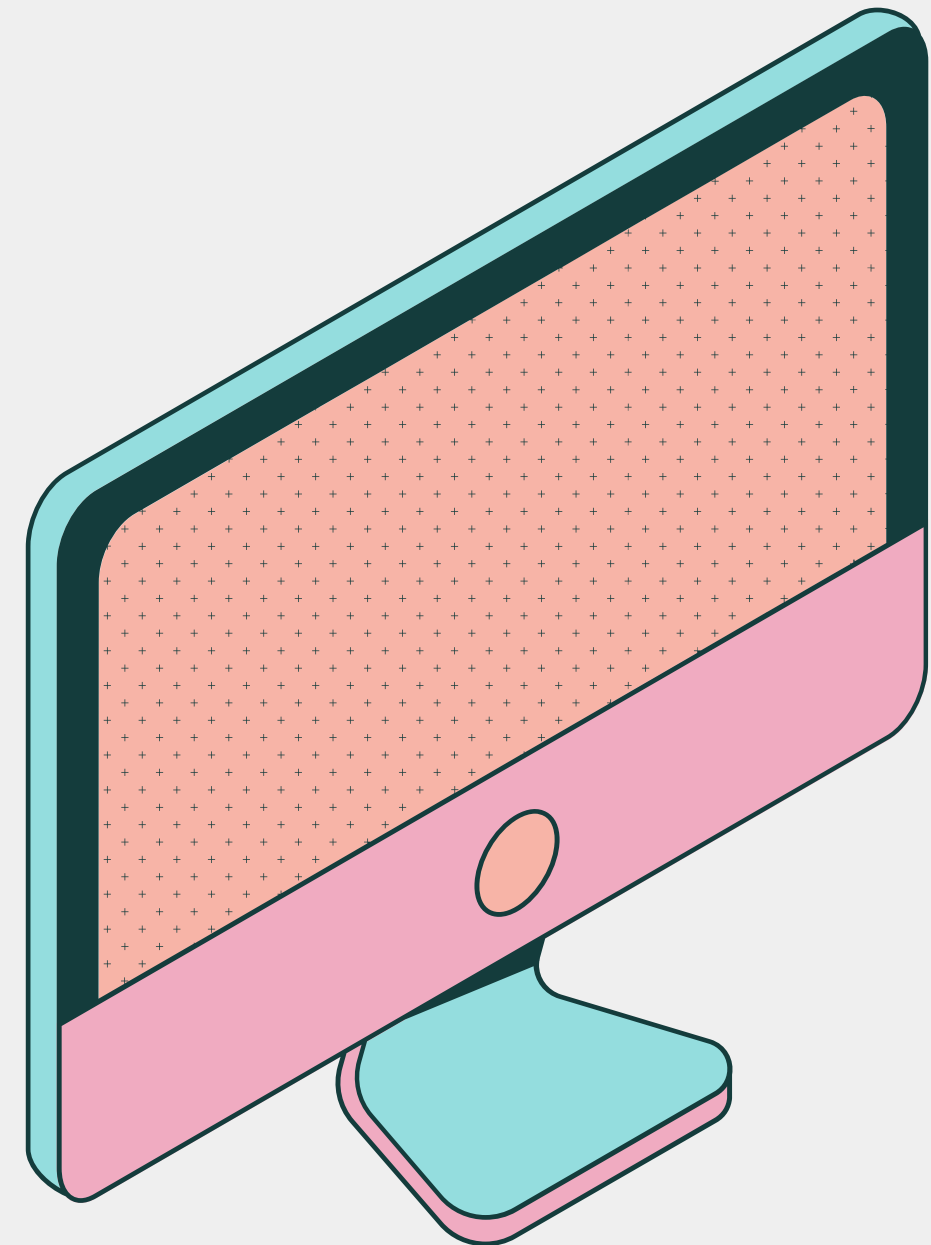


# Lung Segmentation of X-Ray Images

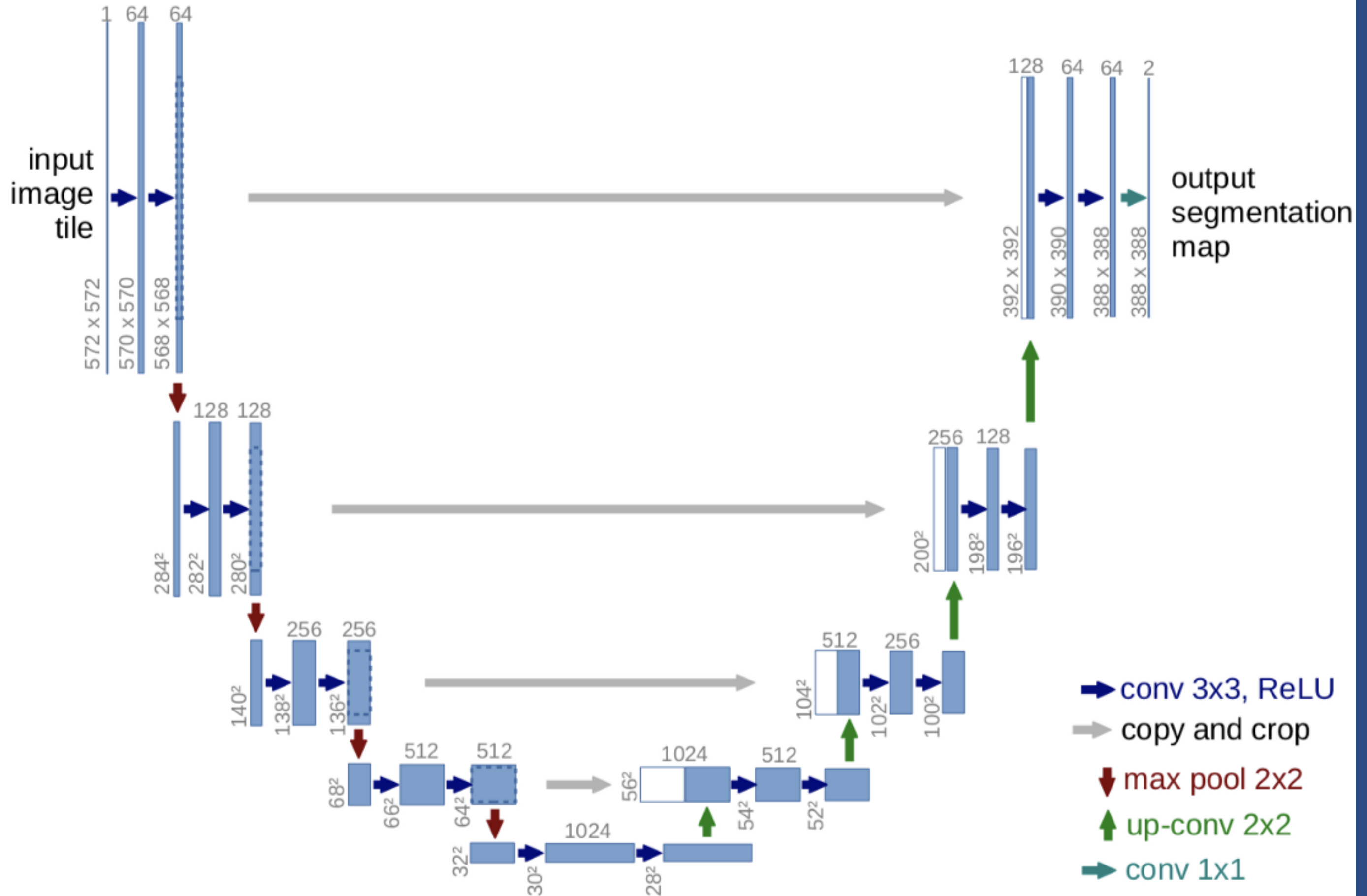
Pixel Wise Image Segmentation of Chest X-Ray Images for Pulmonary Defect Detection.

## 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/Valida  
tion/Test  
Split

3

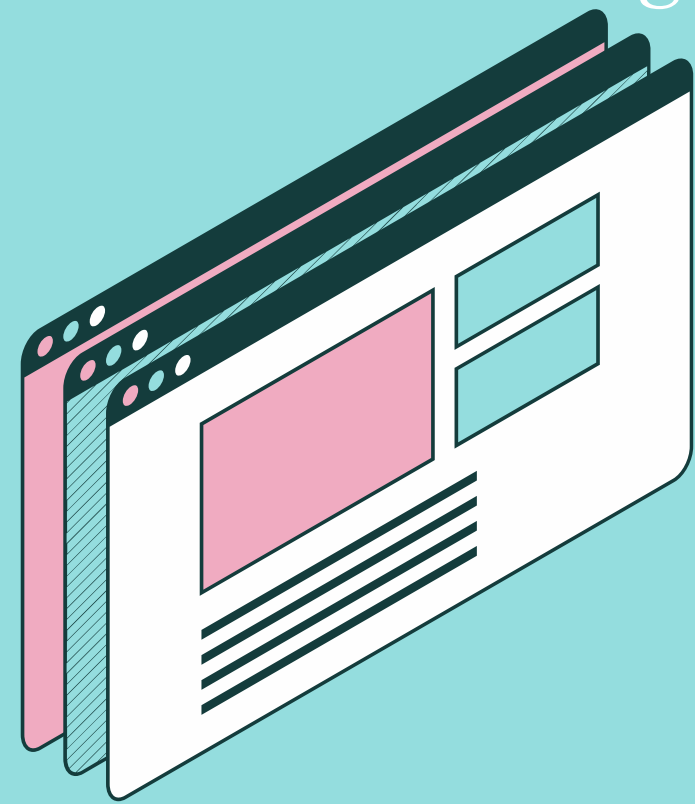
Defining  
Convolution  
Blocks and  
CNN Layers

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

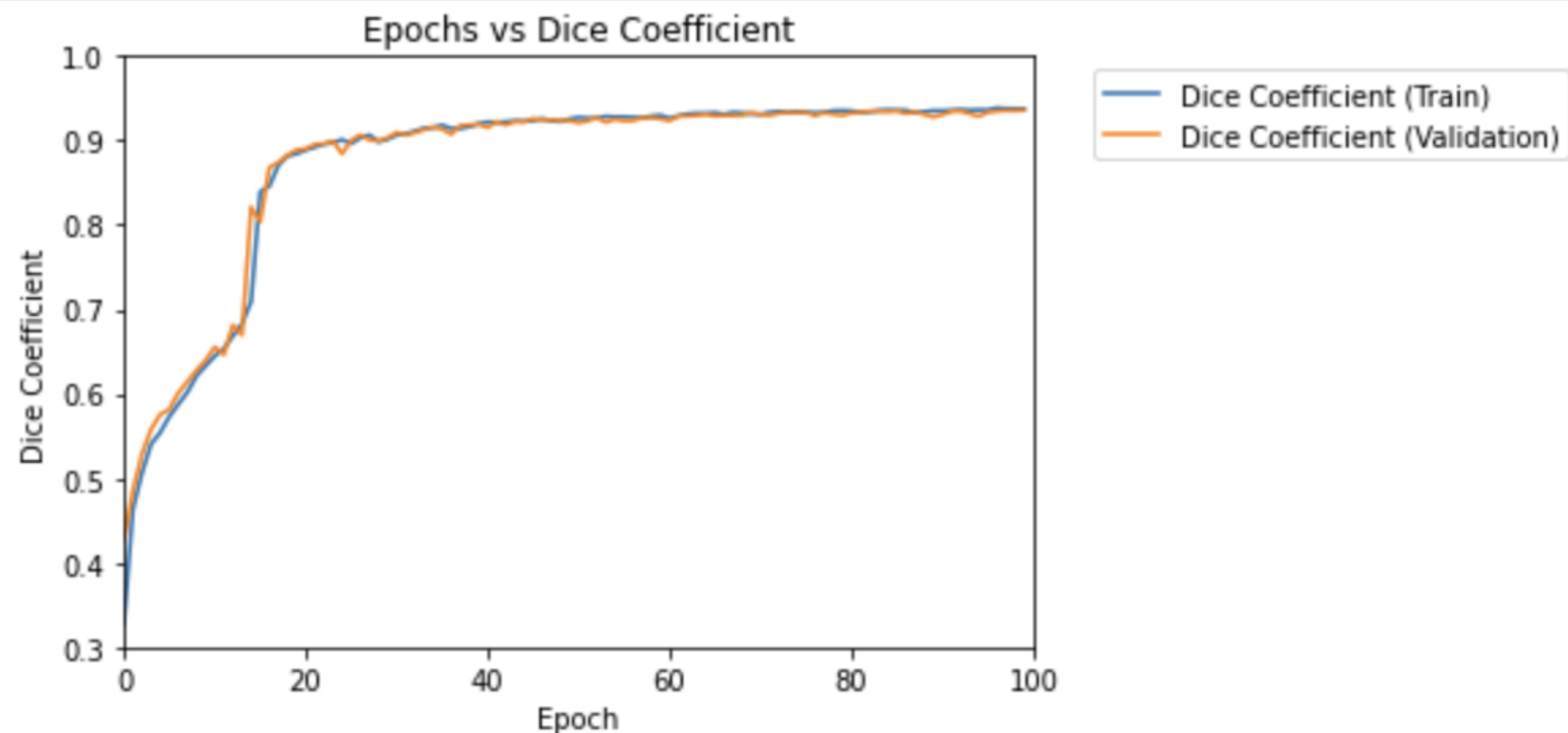
FP = False Positive

FN = False Negative



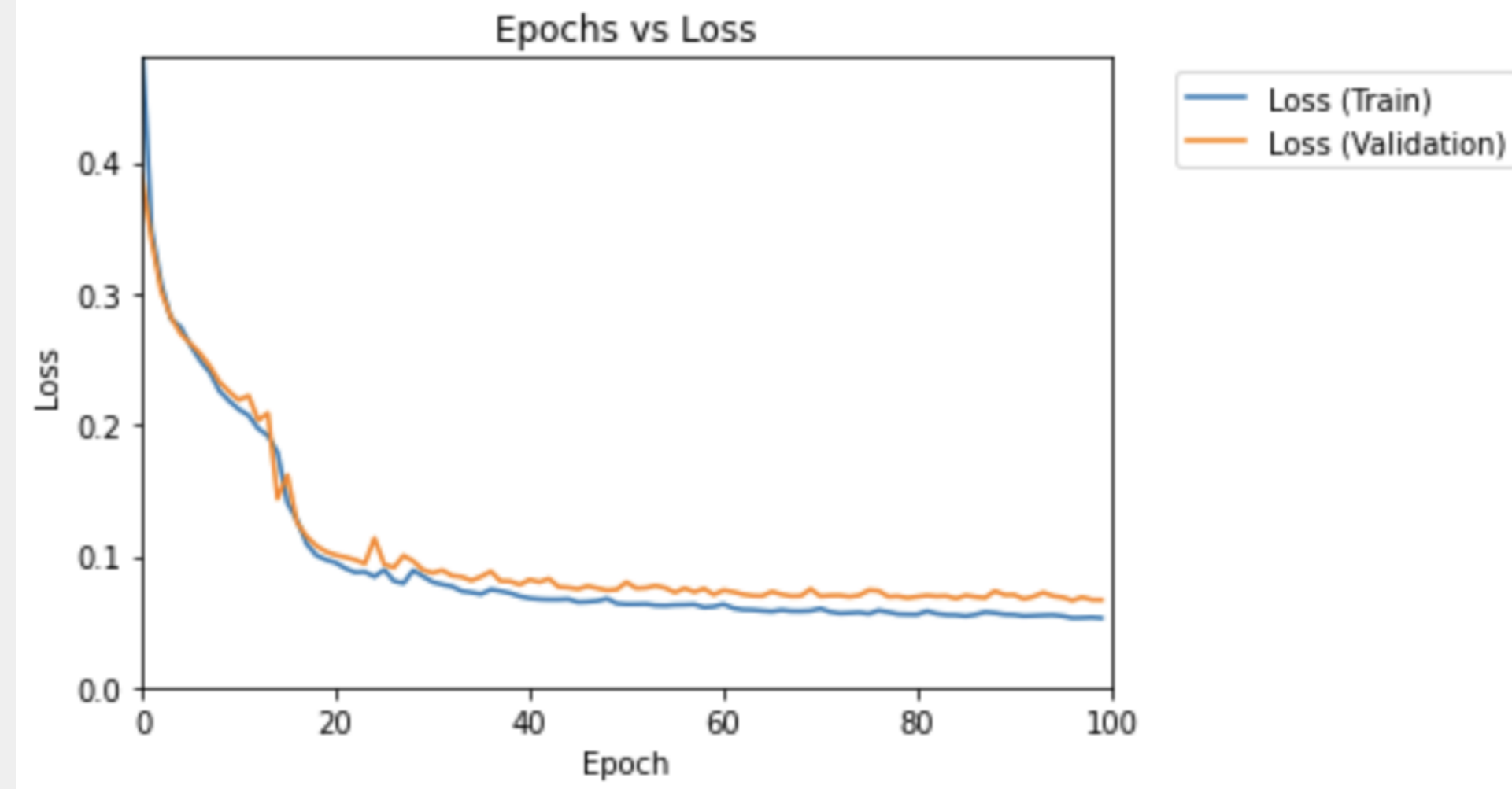


# Results after Training the UNET model



Epochs VS Dice Coefficient

Epochs VS Loss





# Evaluation and Prediction on Test Data

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



Original X-Ray



True Mask



Predicted Mask



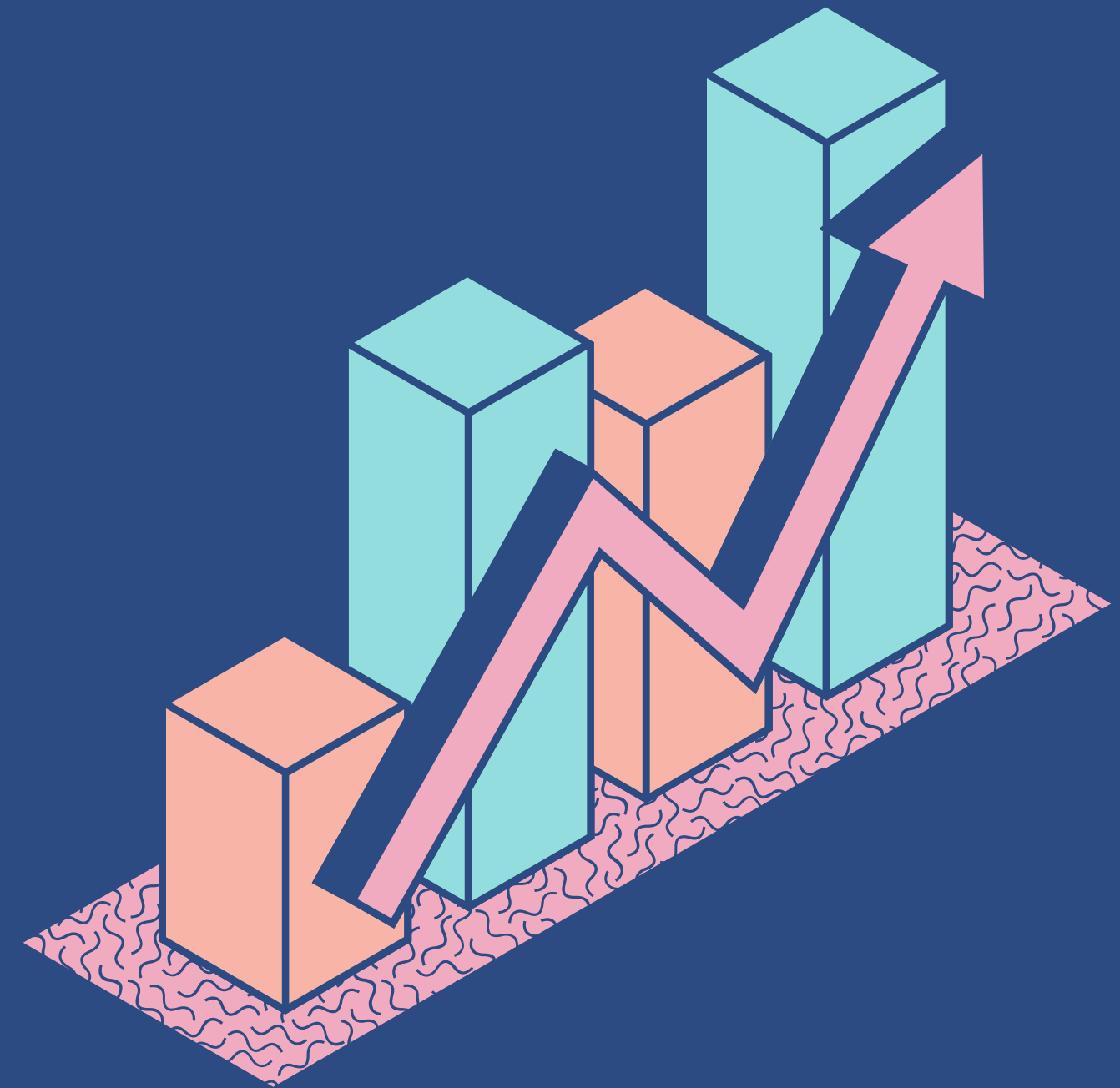
Original X-Ray



True Mask



Predicted Mask



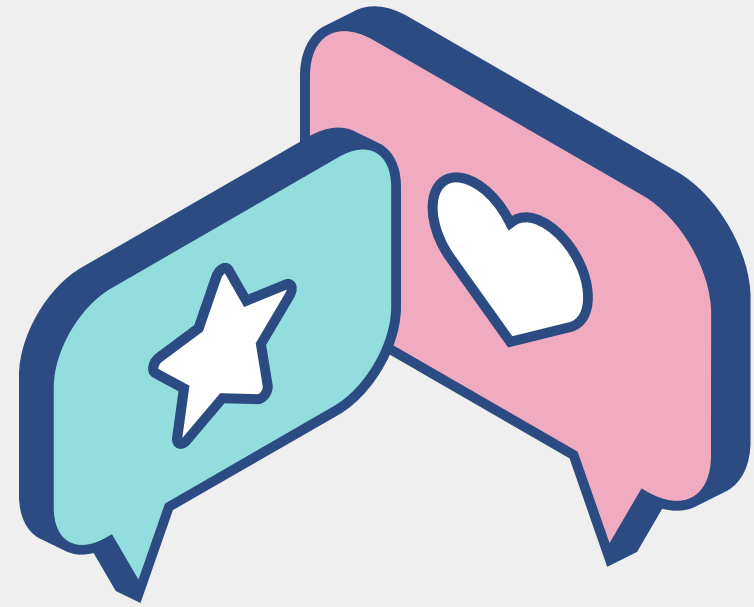
# Edge Detection on X-Ray Images

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

## Tech Stack:

1. Python Programming Language
2. OpenCV Library



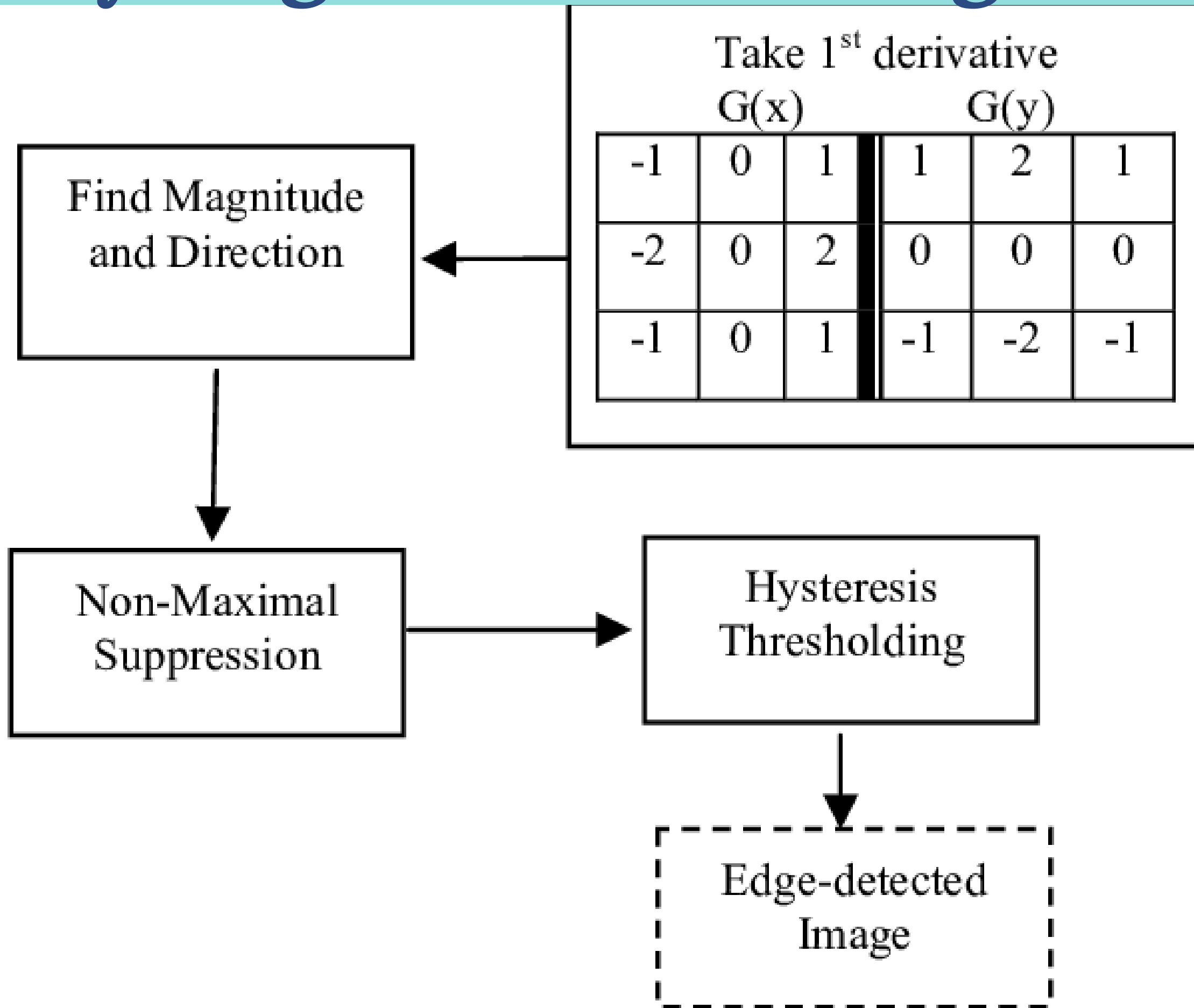


# Approach for Edge Detection

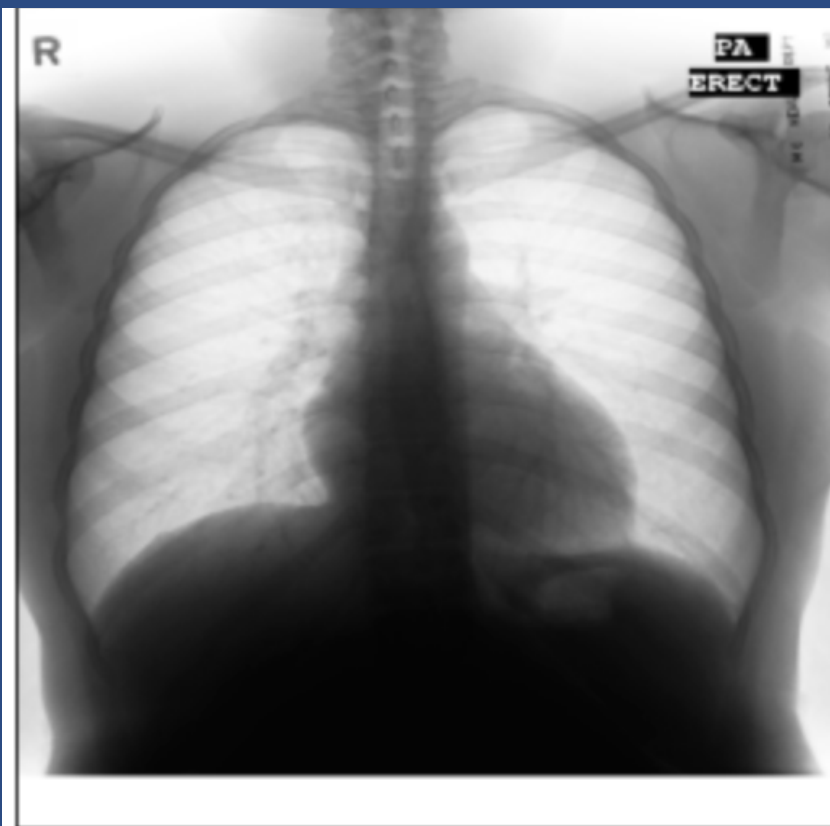
1. Finding Optimal Threshold values using Track-bar
2. Finding Optimal Kernel Size using Track-Bar
3. Data Extraction and Resizing the Image to 512x512
4. Gaussian Blur
5. Canny Edge Detection



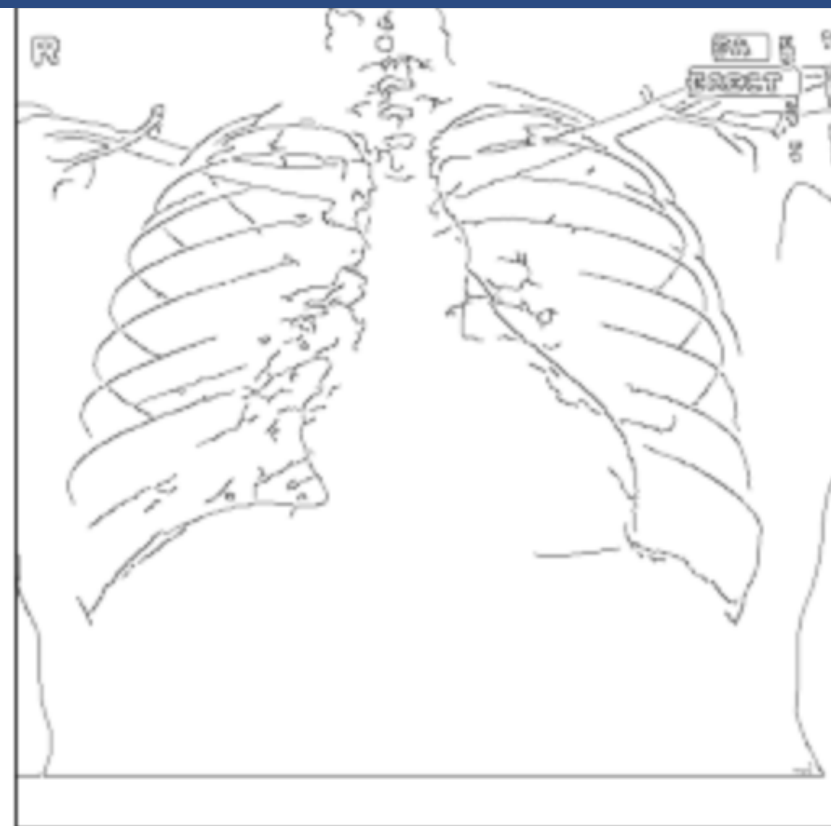
# Canny Edge Detection Algorithm



# Results after Edge Detection



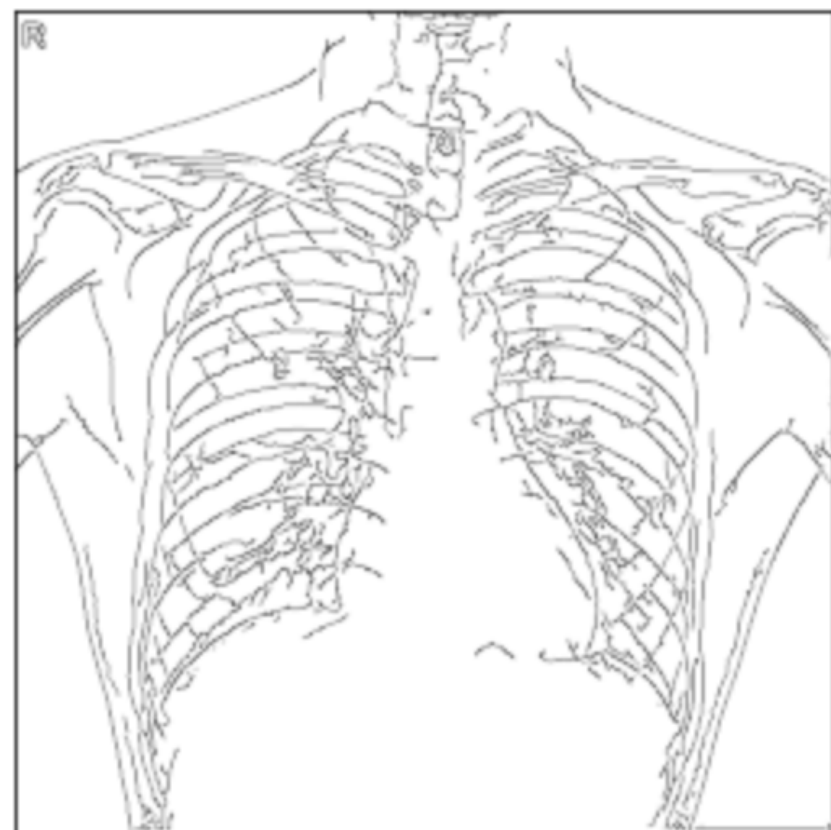
Original Image



Canny Edges



Original Image



Canny Edges





# 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

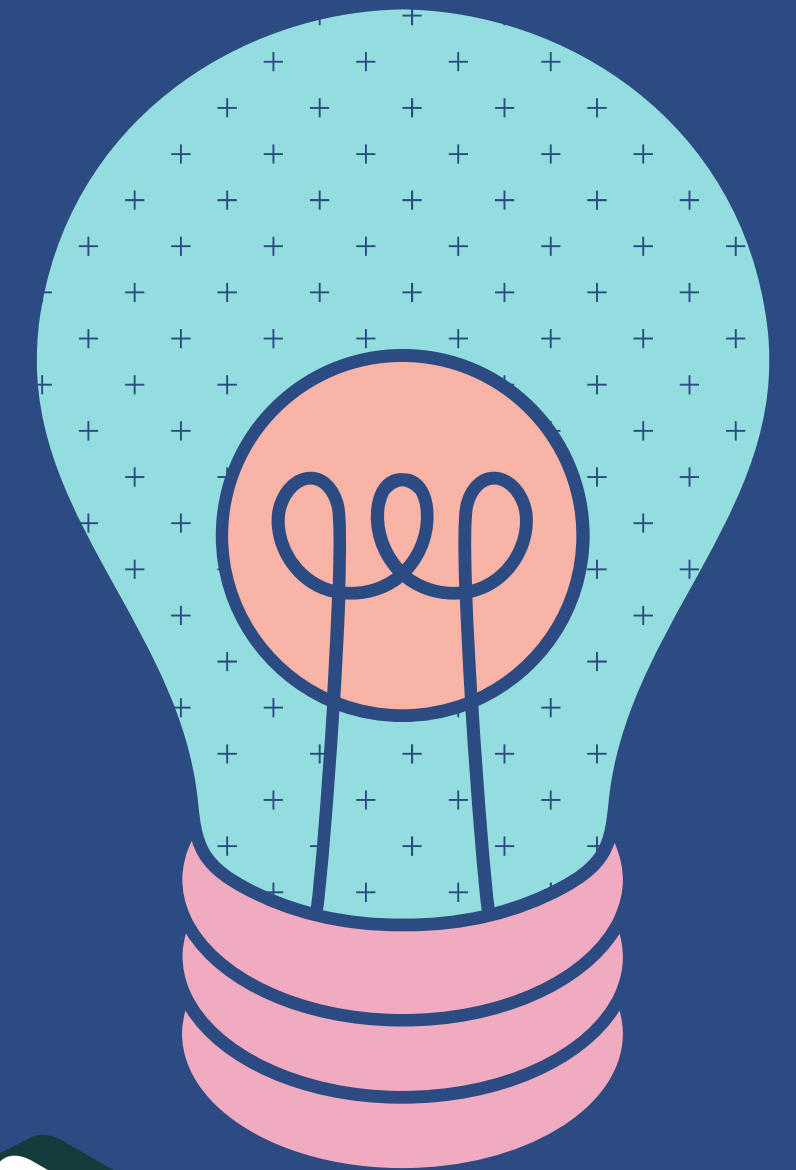


**Link to GitHub Repository:**

[https://github.com/tipsi2022/Medical Imaging and Machine Learning-SRI](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 !!

