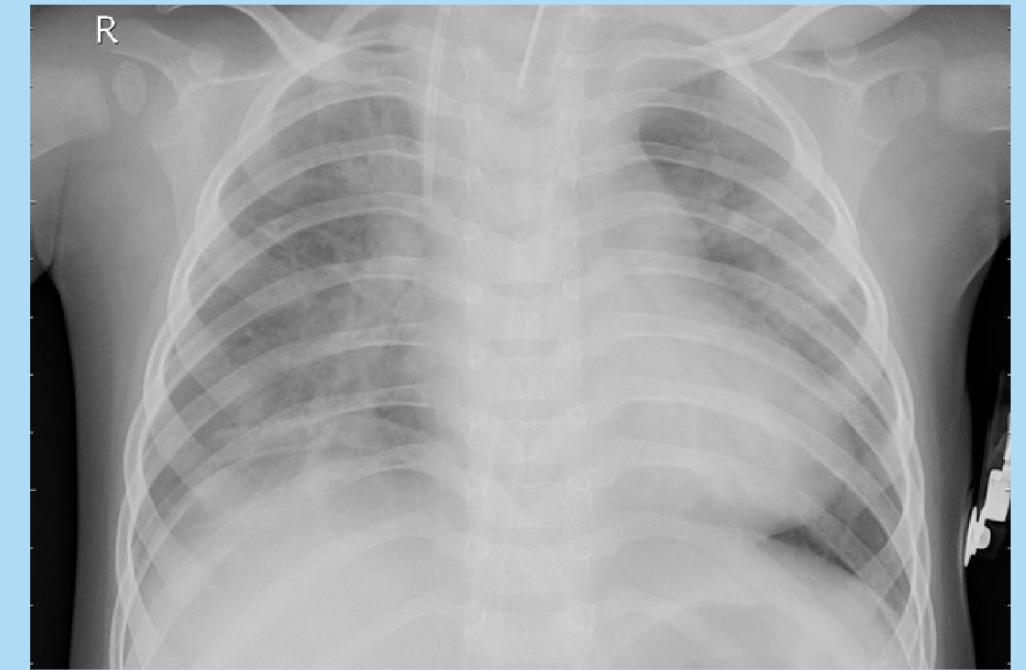
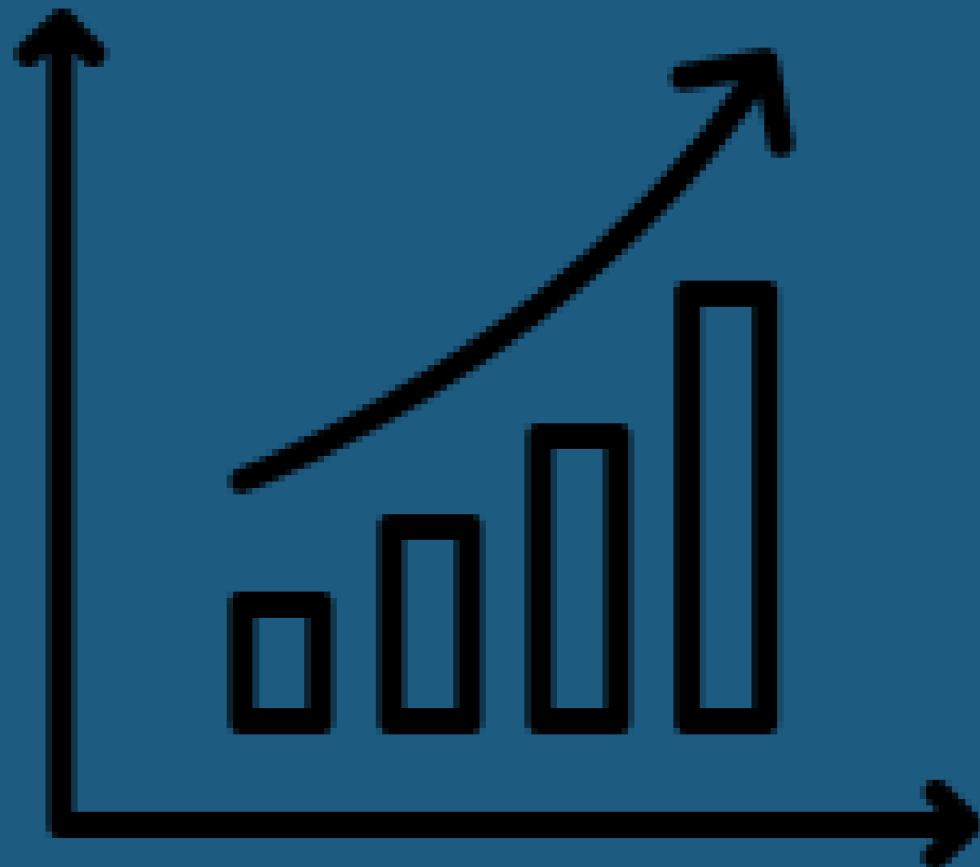


Detection of Lung Diseases using Deep Learning

Does a patient have either COVID-19 or
Pneumonia?



IMPACT OF PNEUMONIA AND COVID-19



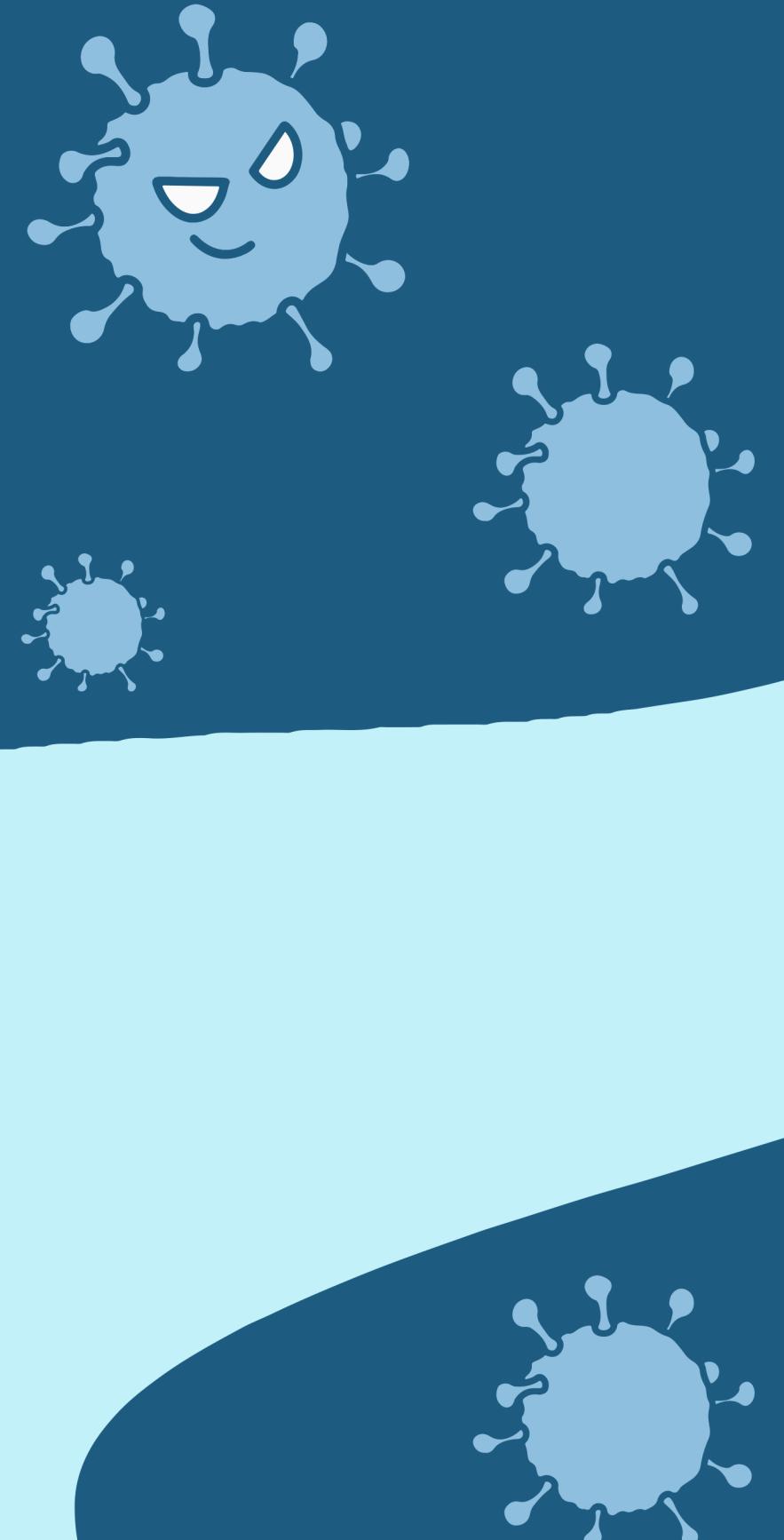
WHY WE NEED THE HELP OF AUTOMATED DETECTION ?



Overview

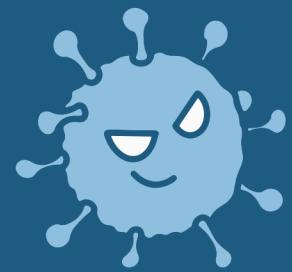
The aim of the project was:

- to develop a CNN model that is able to categorize X-ray images of chest into three categories: ***Pneumonia, Normal and COVID-19***



Project Structure

- 01 Data Preprocessing
- 02 Data Augmentation
- 03 Model Definition
- 04 Training and Evaluation



Data Preprocessing

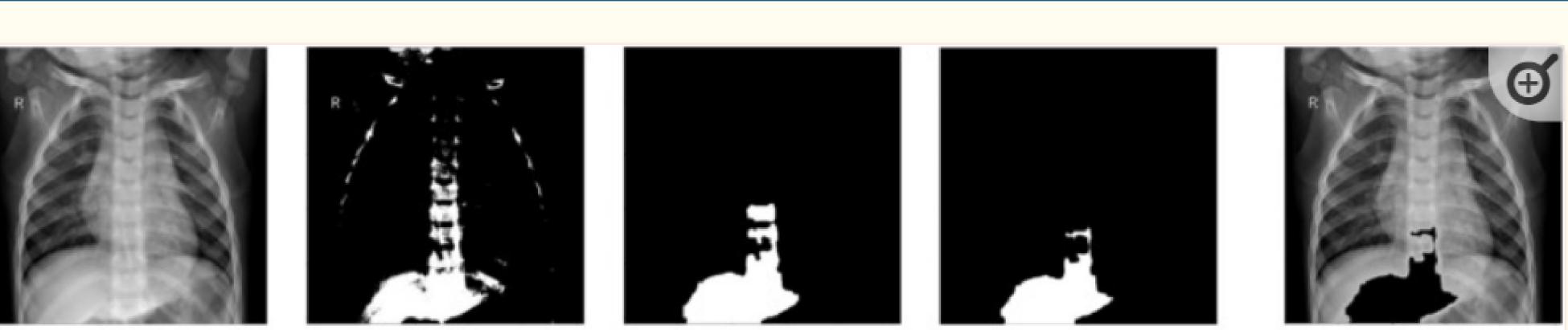


- The code **loads** images from directories of three classes: 'pneumonia', 'normal', and 'covid'.

- Images are converted to **grayscale** and **resized** to **150x150** pixels and **224x224** pixels for different models.

Image Preprocessing includes:
diaphragm removal algorithm,
splitting the image into three different channels, applying
bilateral filter and histogram equalization

normal



covid



pneumonia



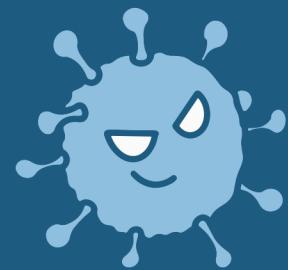
a

b

c

d

e

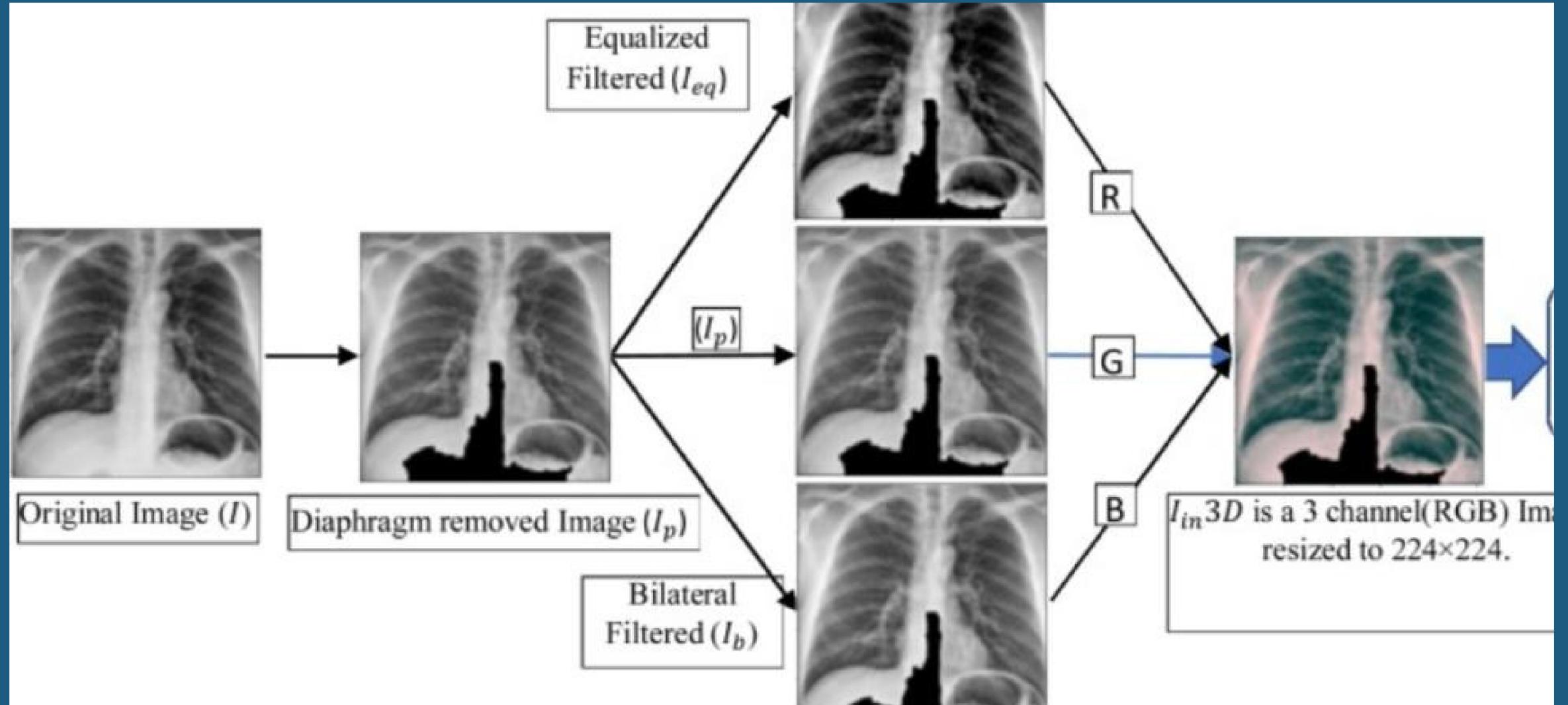


Data Preprocessing

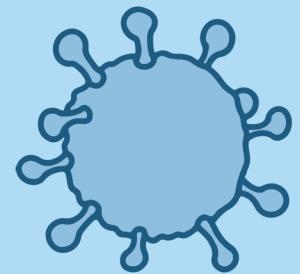
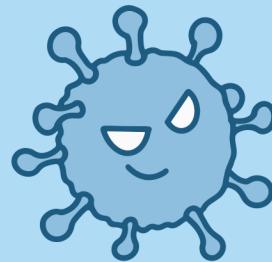


- The code **loads** images from directories of three classes: 'pneumonia', 'normal', and 'covid'.
- Images are converted to **grayscale** and **resized** to **150x150** pixels and **224x224** pixels for different models.

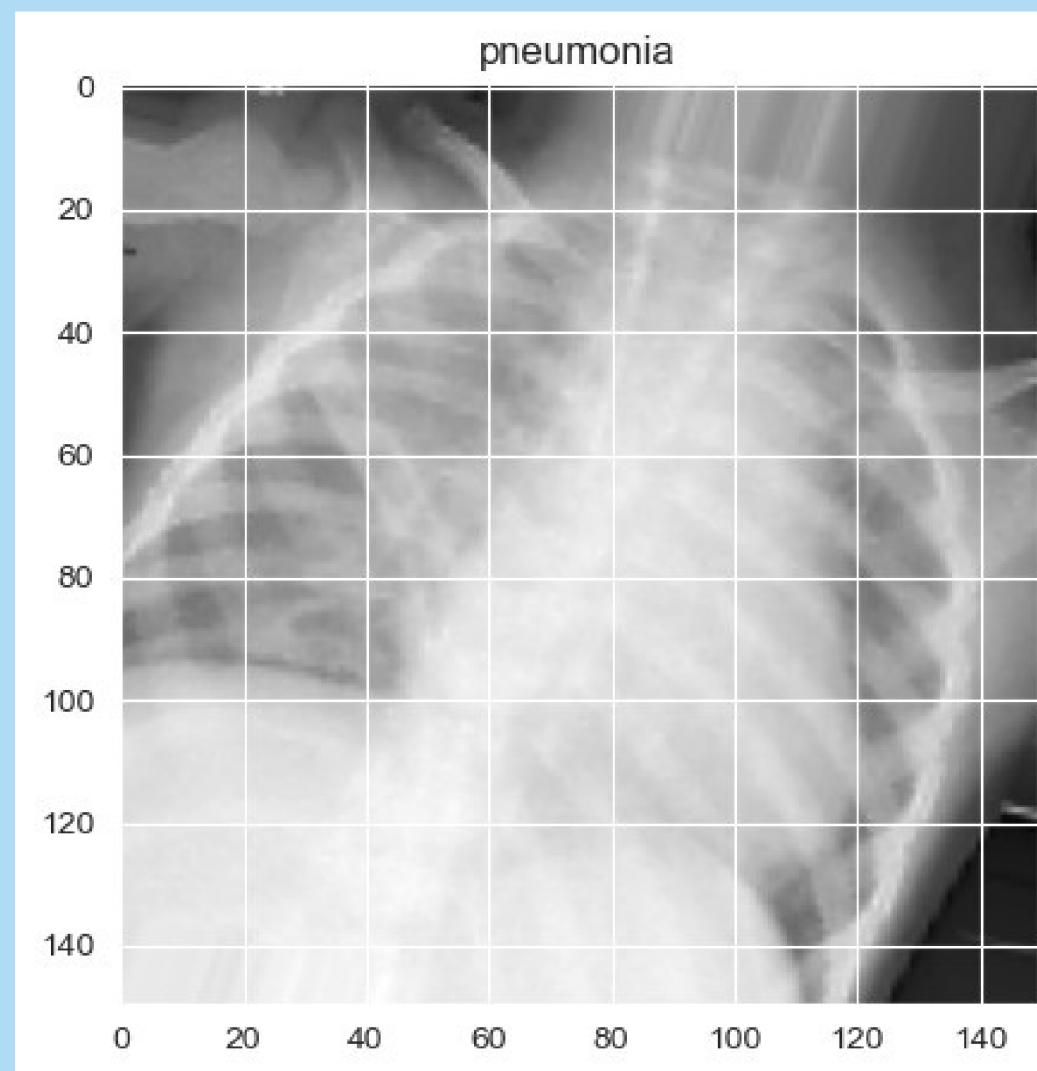
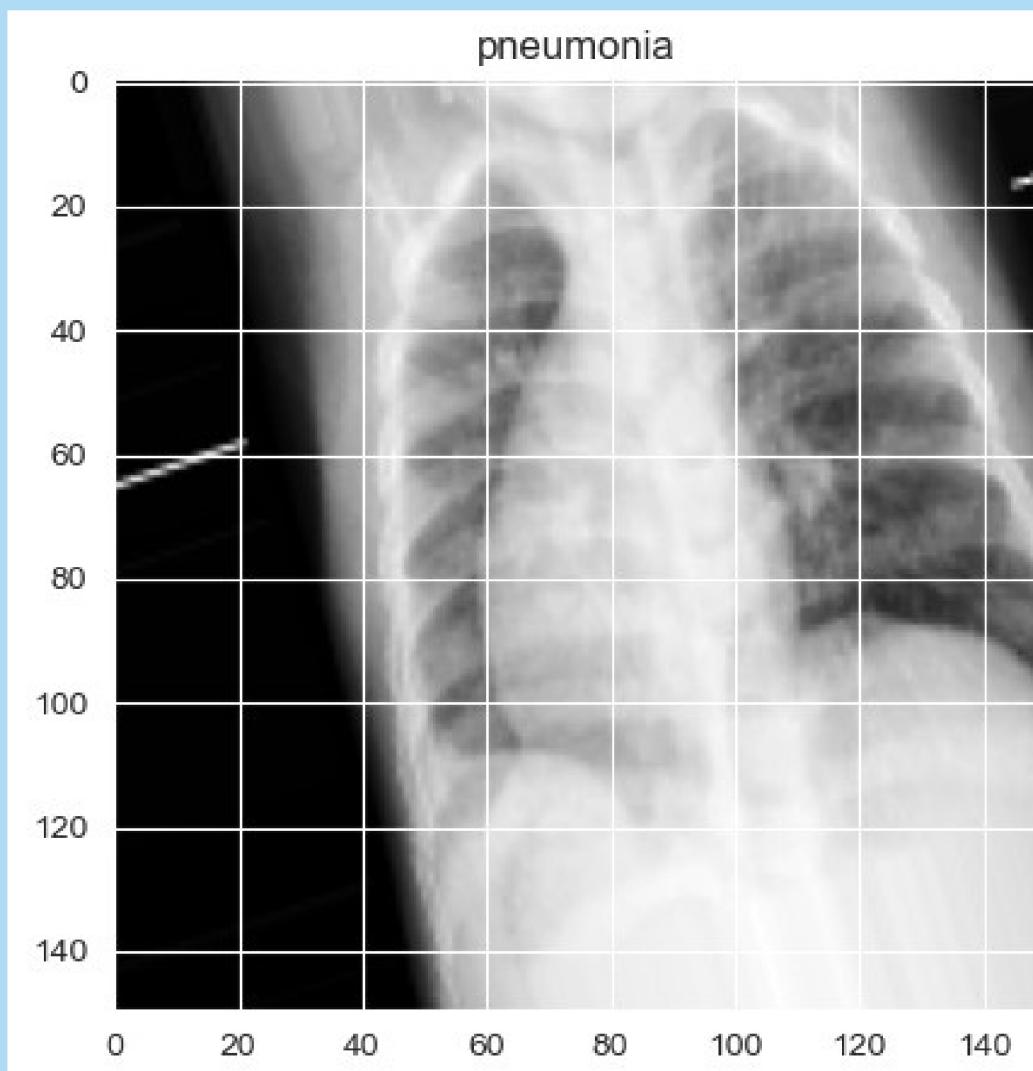
Image Preprocessing includes:
diaphragm removal algorithm,
splitting the image into three different channels, applying
bilateral filter and **histogram equalization**



Data Augmentation



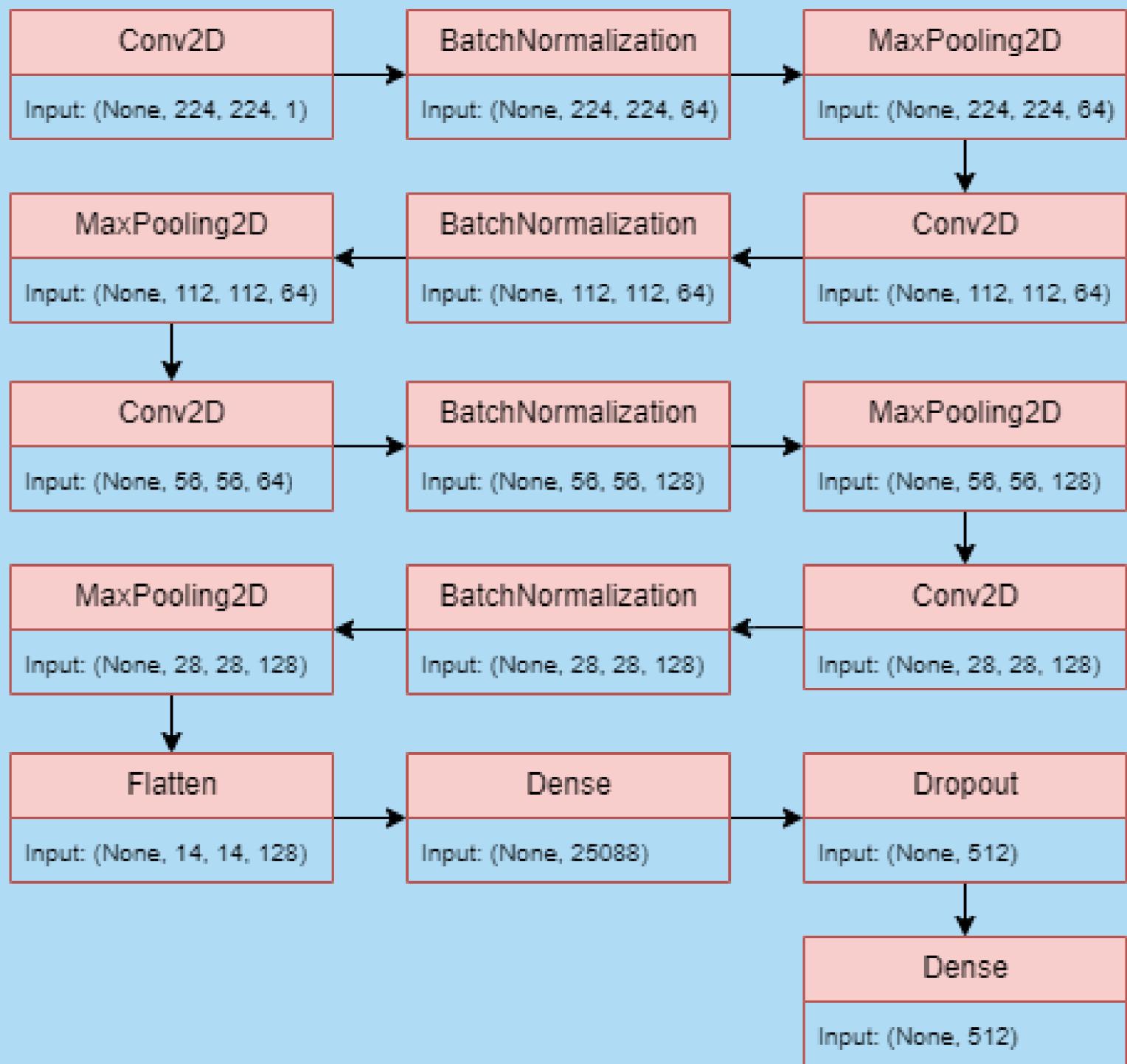
Data augmentation was implemented to increase the size of the dataset by applying various image transformations, such as randomly zooming, flipping, shifting



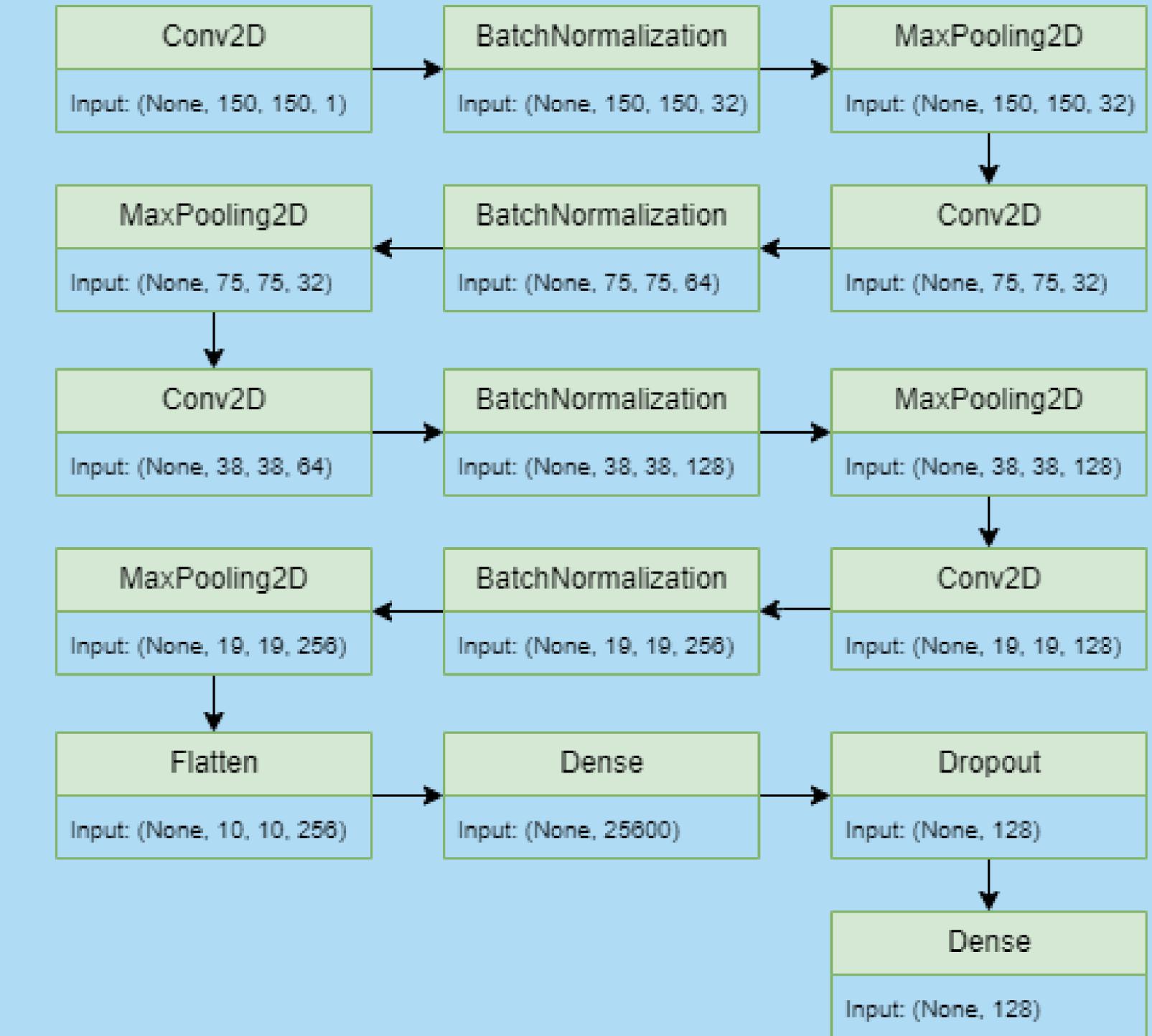
```
rotation_range=20,  
width_shift_range=0.2,  
height_shift_range=0.2,  
shear_range=0.2,  
zoom_range=0.2,  
horizontal_flip=True,  
fill_mode='nearest'
```

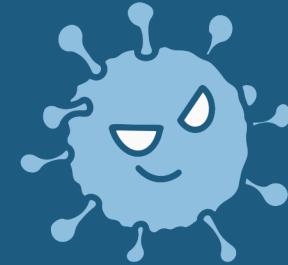
Model Architecture Visual Representation

Model 1



Model 2





Training and Evaluation

Model 1

using normal dataset

Version 1

- 50 epochs
- Batch size 32
- Using Learning Rate Reduction with 0.0010 as the starting learning rate

using preprocessed dataset

Version 2

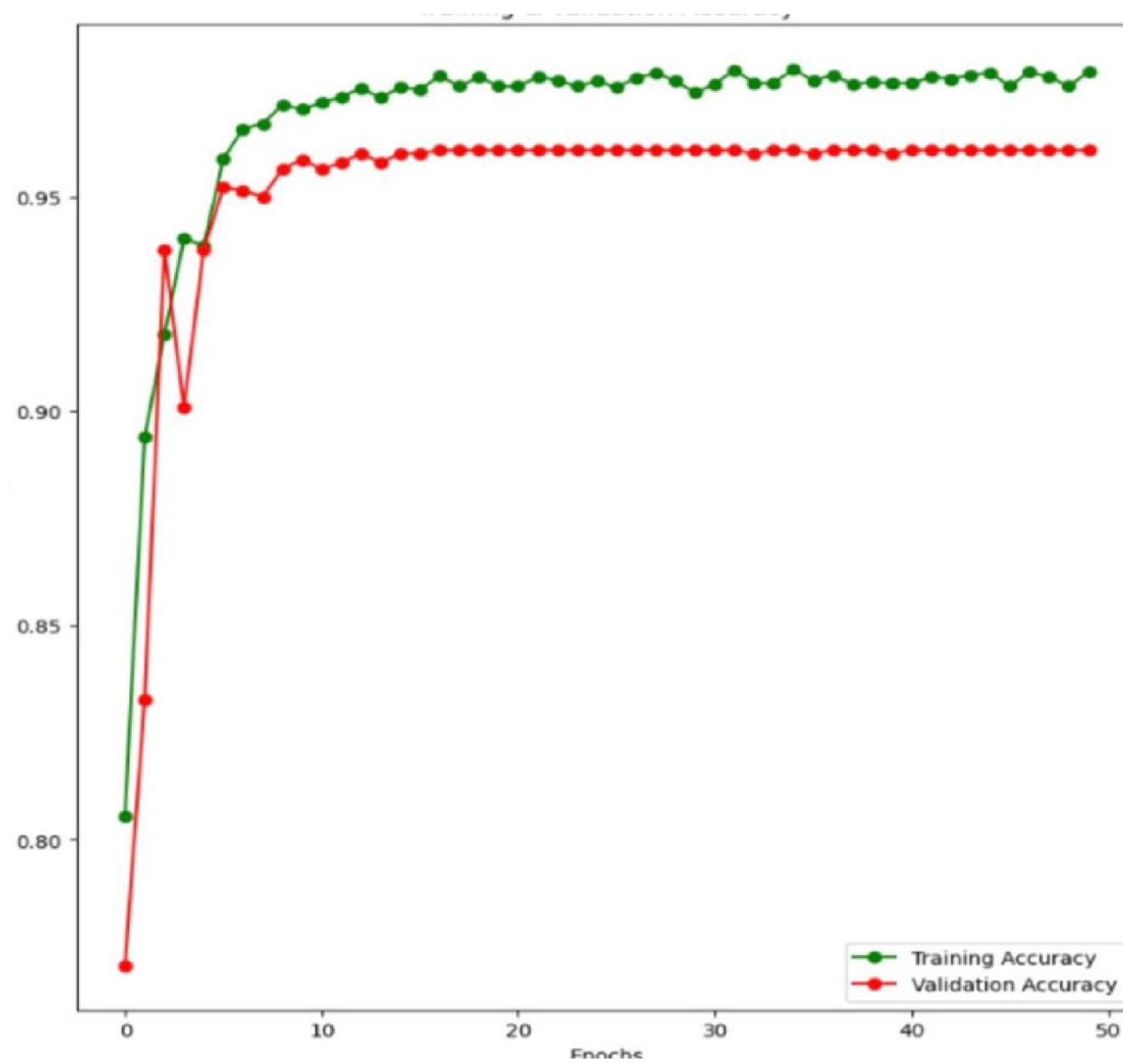
- 50 epochs
- Batch size 32
- Using Learning Rate Reduction with 0.0010 as the starting learning rate
- Early stopping was implemented to prevent overfitting

Model 2

- 50 epochs
- Batch size 32
- Using Learning Rate Reduction with 0.0010 as the starting learning rate
- Early stopping and learning rate reduction were implemented to prevent overfitting

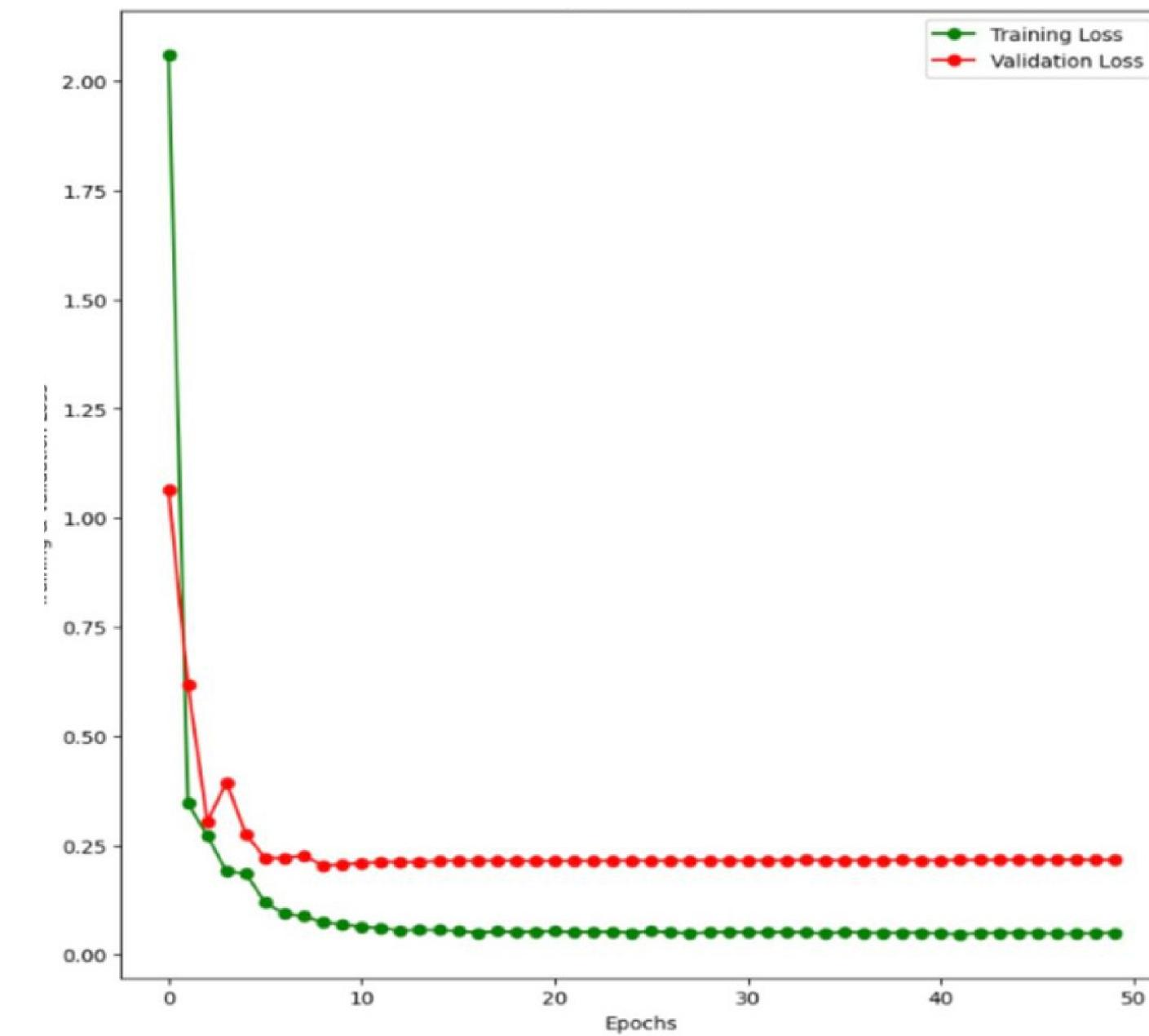


Accuracy



99.55% on training
99.68% on validation
96.05% on testing

LOSS

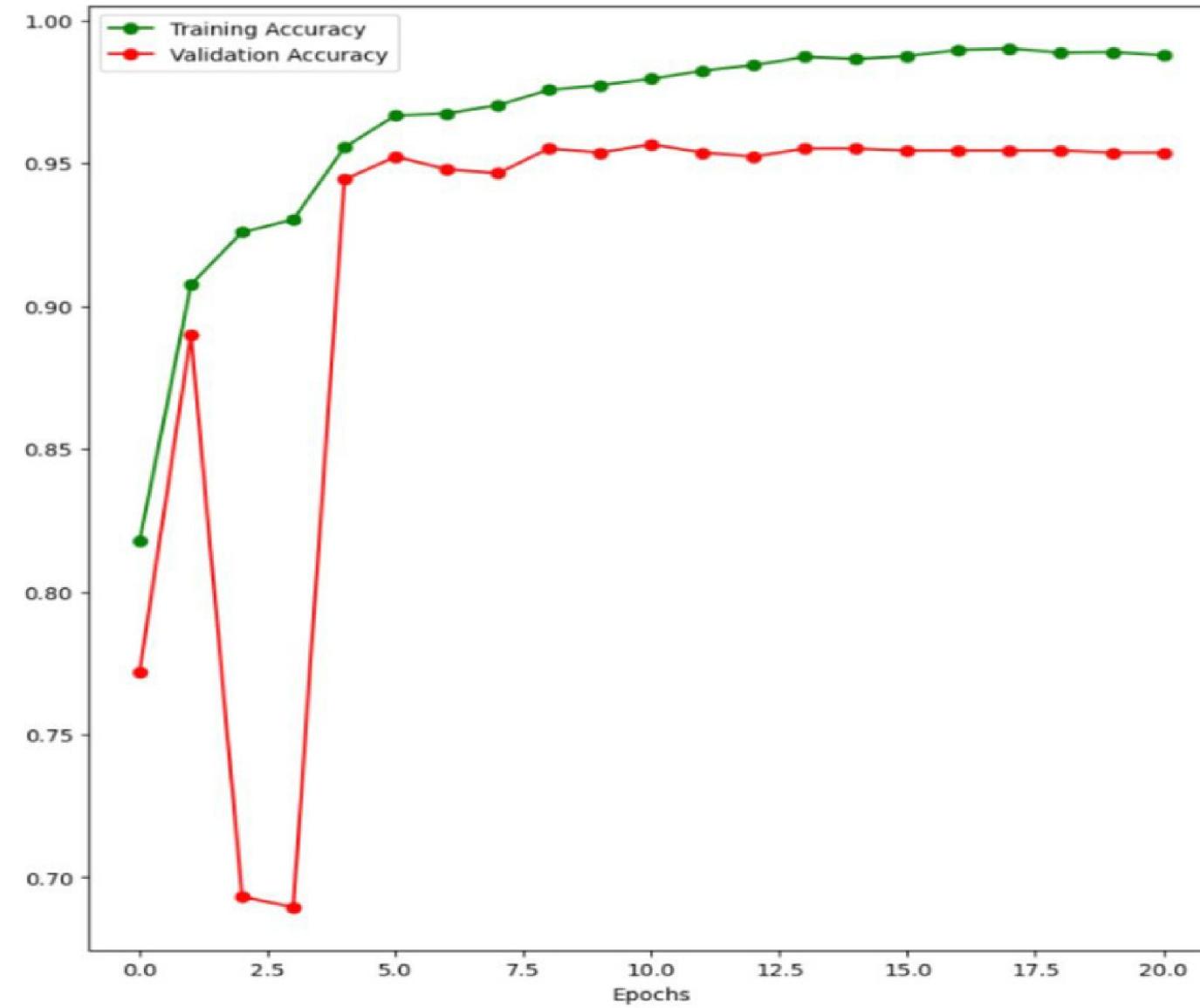


0.0179 on training
0.265 on validation
0.2041 on testing

Result

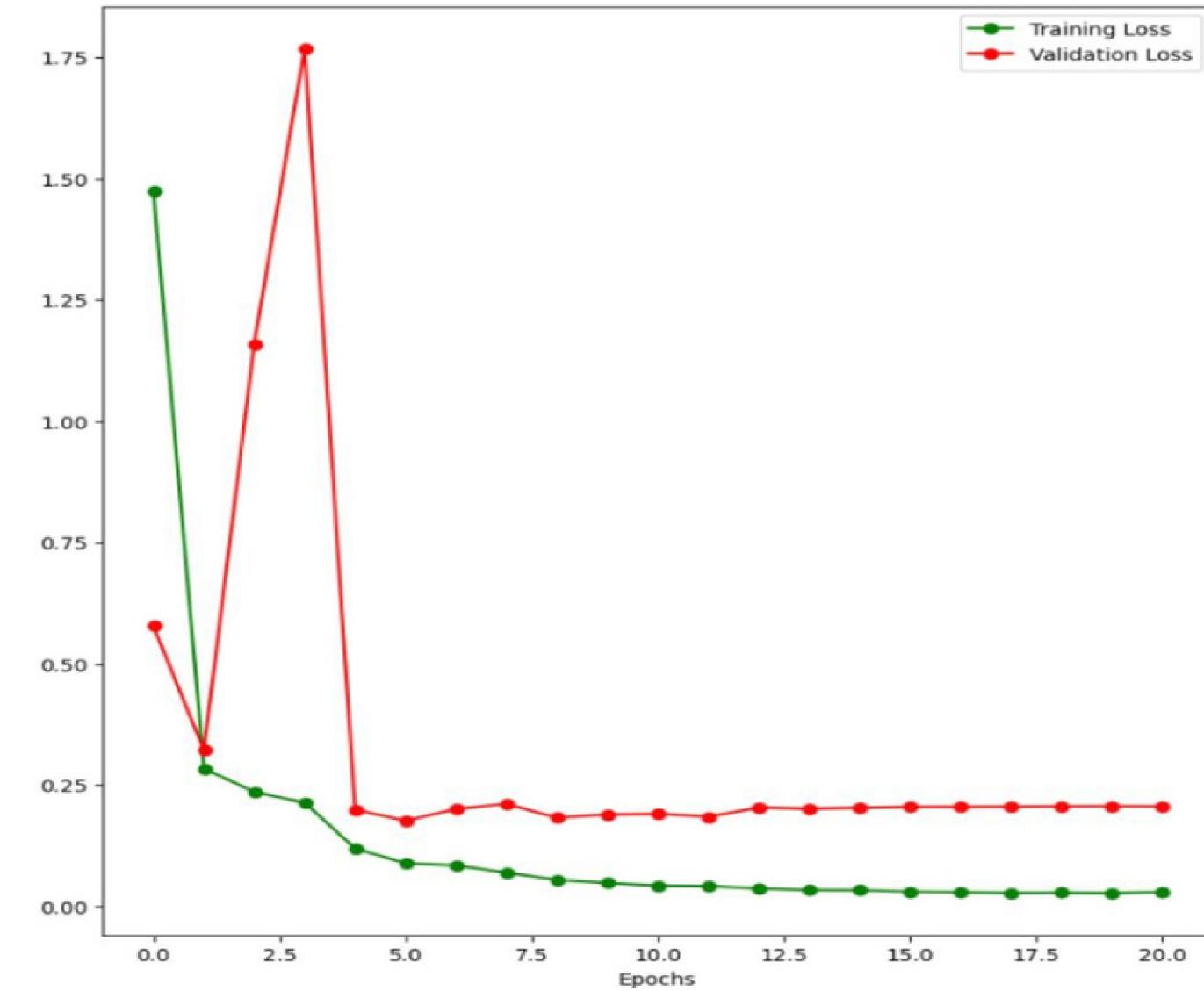
Module 1 version 1
Accuracy and Loss

Accuracy



97.65% on training
95.51% on validation
95.29% on testing

LOSS

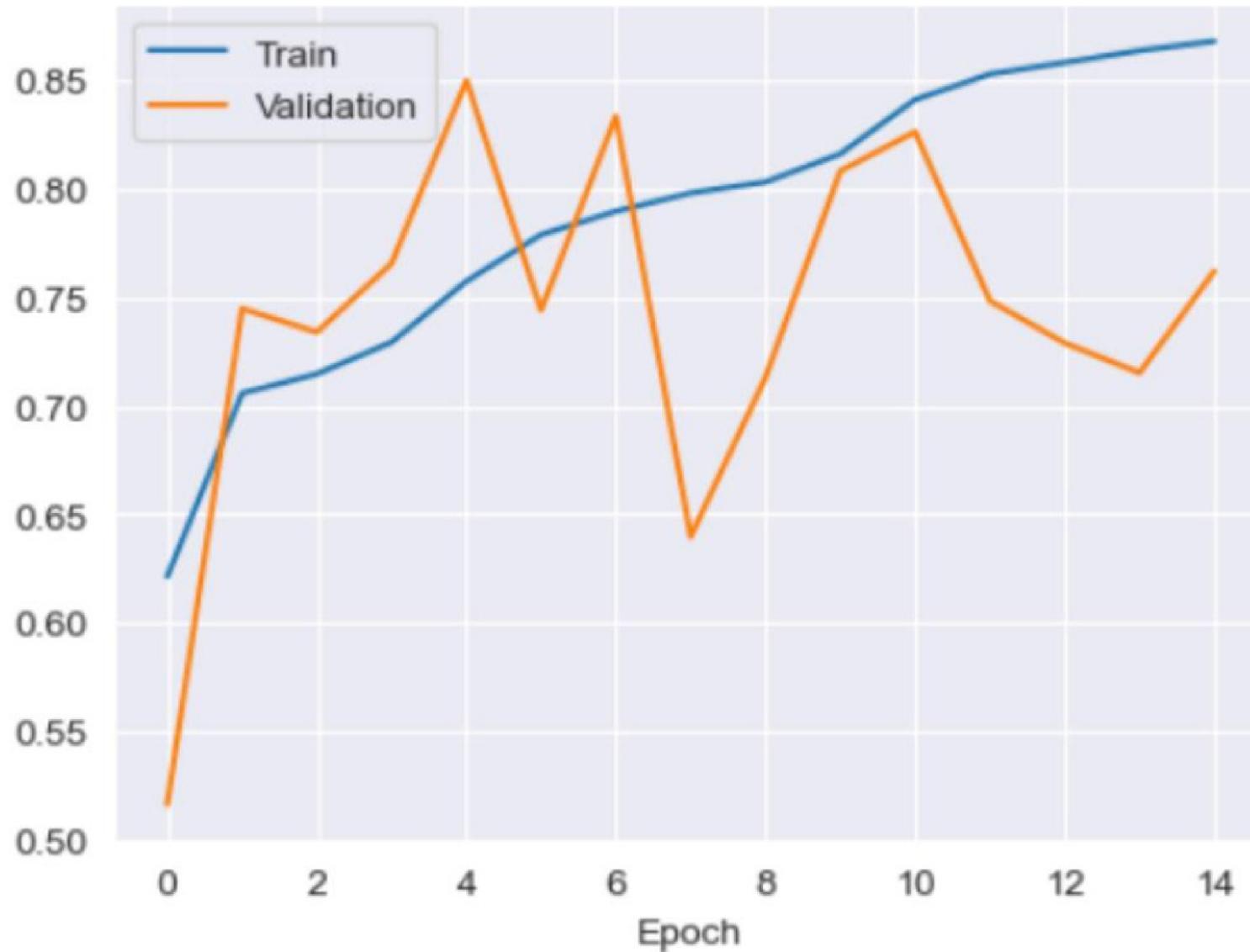


0.0556 on training
0.1825 on validation
0.2681 on testing

Result

Module 1 version 2
Accuracy and Loss

Accuracy

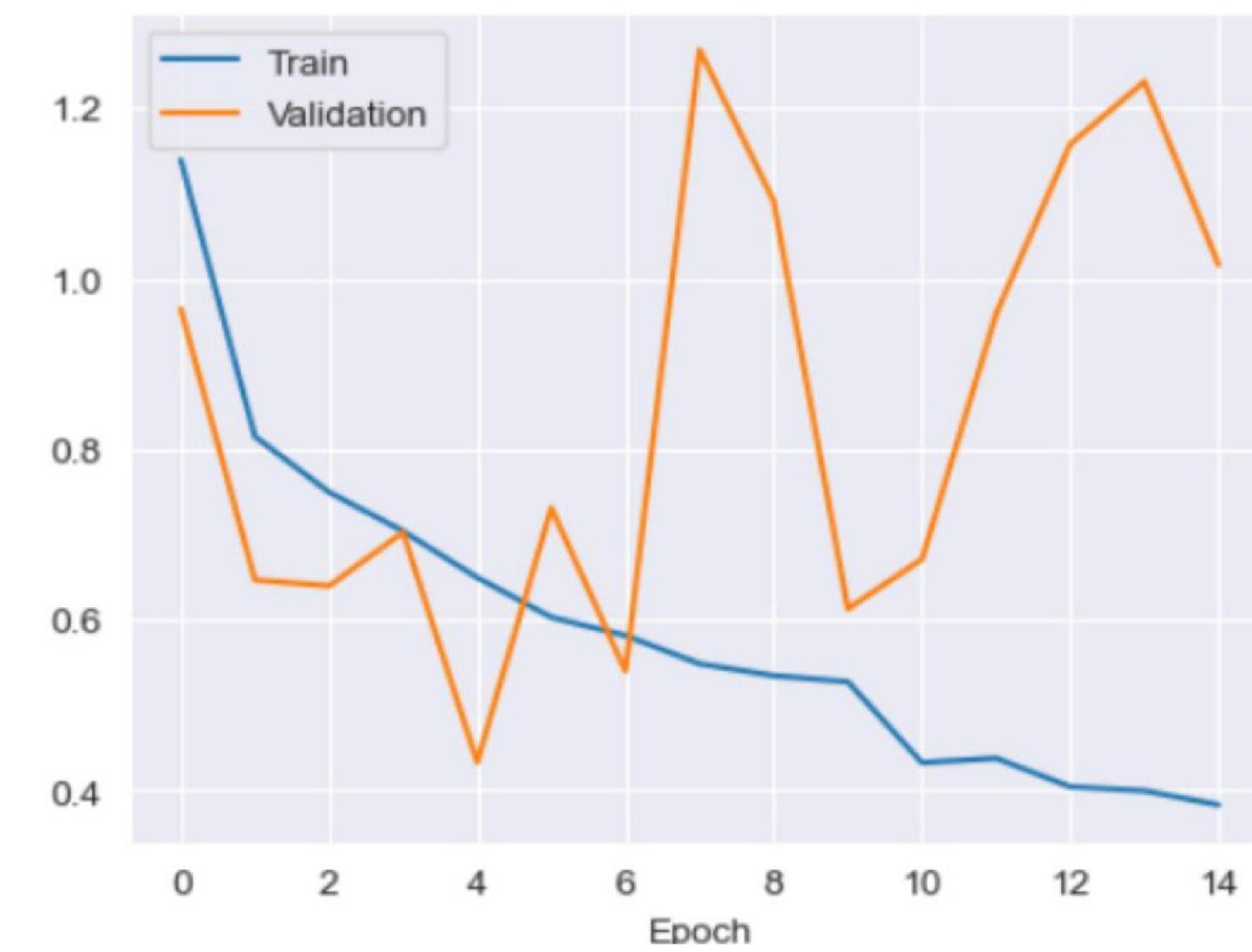


87.60% on training

85.01% on validation

85.69% on testing

LOSS



0.3894 on training

0.4332 on validation

0.4403 on testing

Result

Module 2
Accuracy and Loss

The Future

We will look into the reason why preprocessing images having a negative impact on model 1 and looking for more method to improve the accuracy of the model.

QR CODE



GITHUB

THANK YOU

