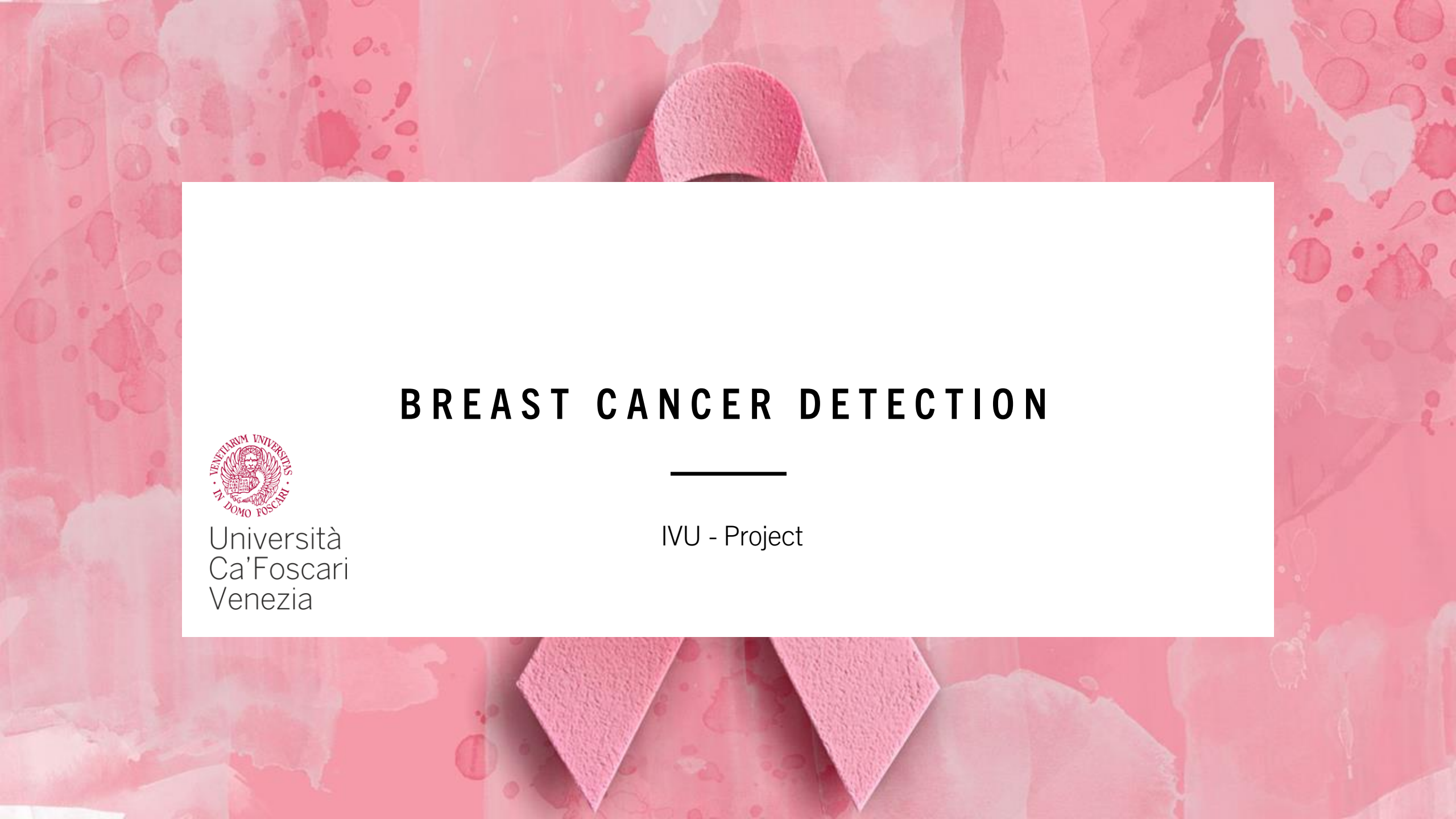


BREAST CANCER DETECTION

Università
Ca'Foscari
Venezia

IVU - Project

OCTOBER IS DEDICATED TO BREAST CANCER AWARENESS

- Breast Cancer: is a disease in which abnormal breast cells grow out of control and form tumours. If left unchecked, the tumours can spread throughout the body and become fatal.

- *Early detection* affects survival rates.

source: https://www.europadonna.org/breast-cancer/

WHO EUROPE REGION IN 2020:

NUMBER OF WOMEN WHO WERE DIAGNOSED WITH BREAST CANCER

576.337

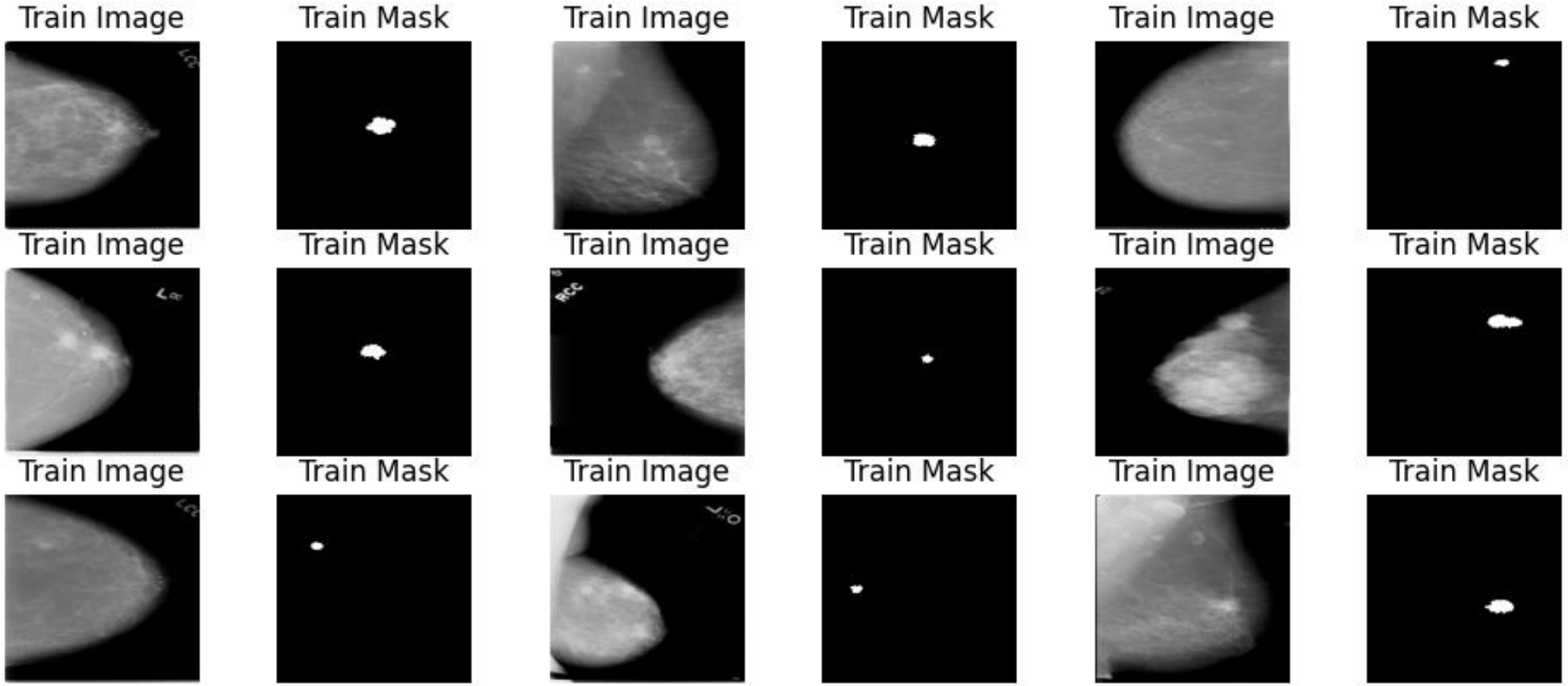
NUMBER OF WOMEN WHO DIED FROM BREAST CANCER

157,100

CBIS-DDSM: BREAST CANCER IMAGE DATASET

- The DDSM is a database of **2,620** scanned film mammography studies.
- It contains normal, benign, and malignant cases with verified pathology information.

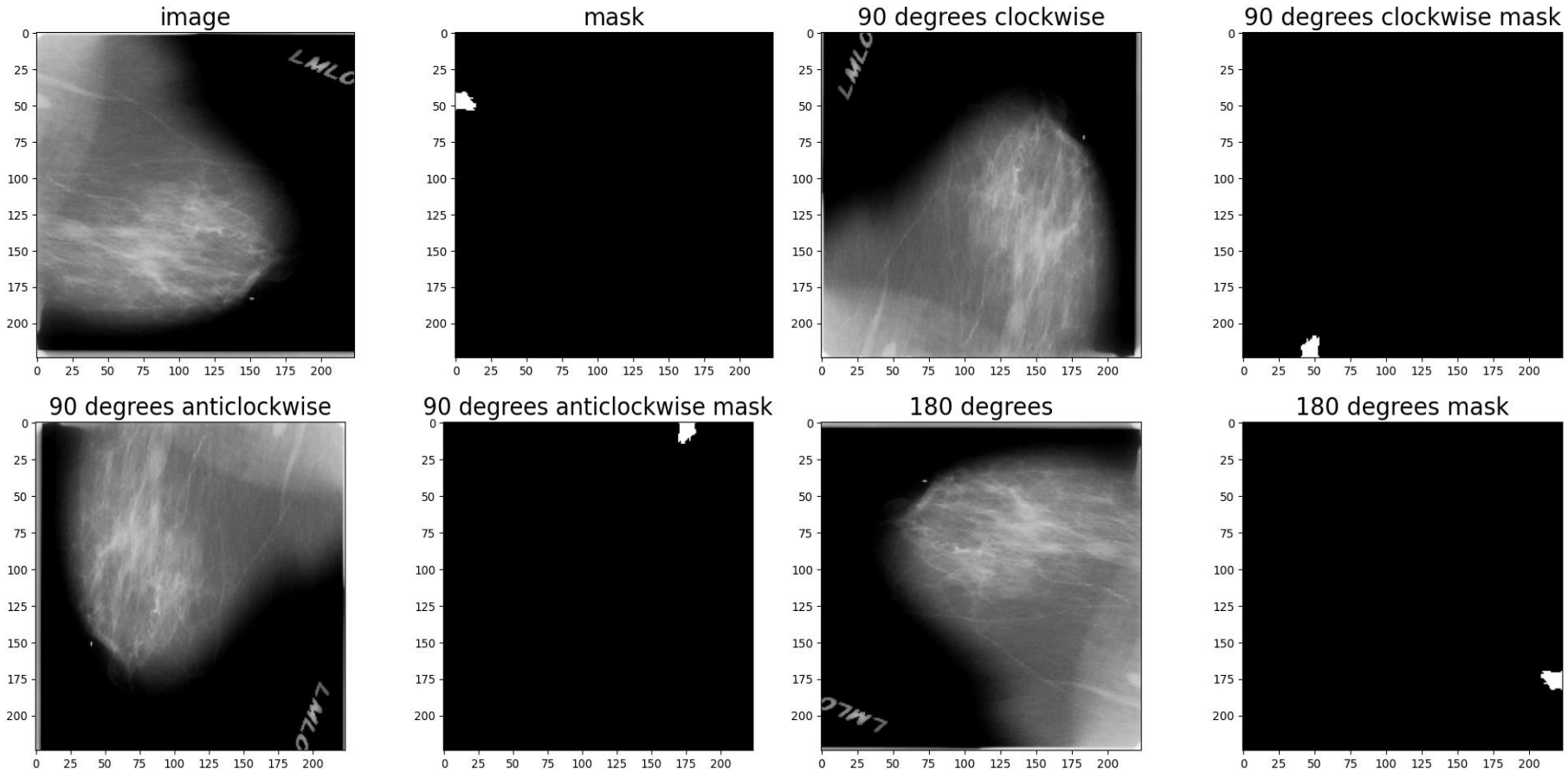
FIRST PROBLEM: IMAGE SEGMENTATION



DATASET WITH FEW ELEMENTS

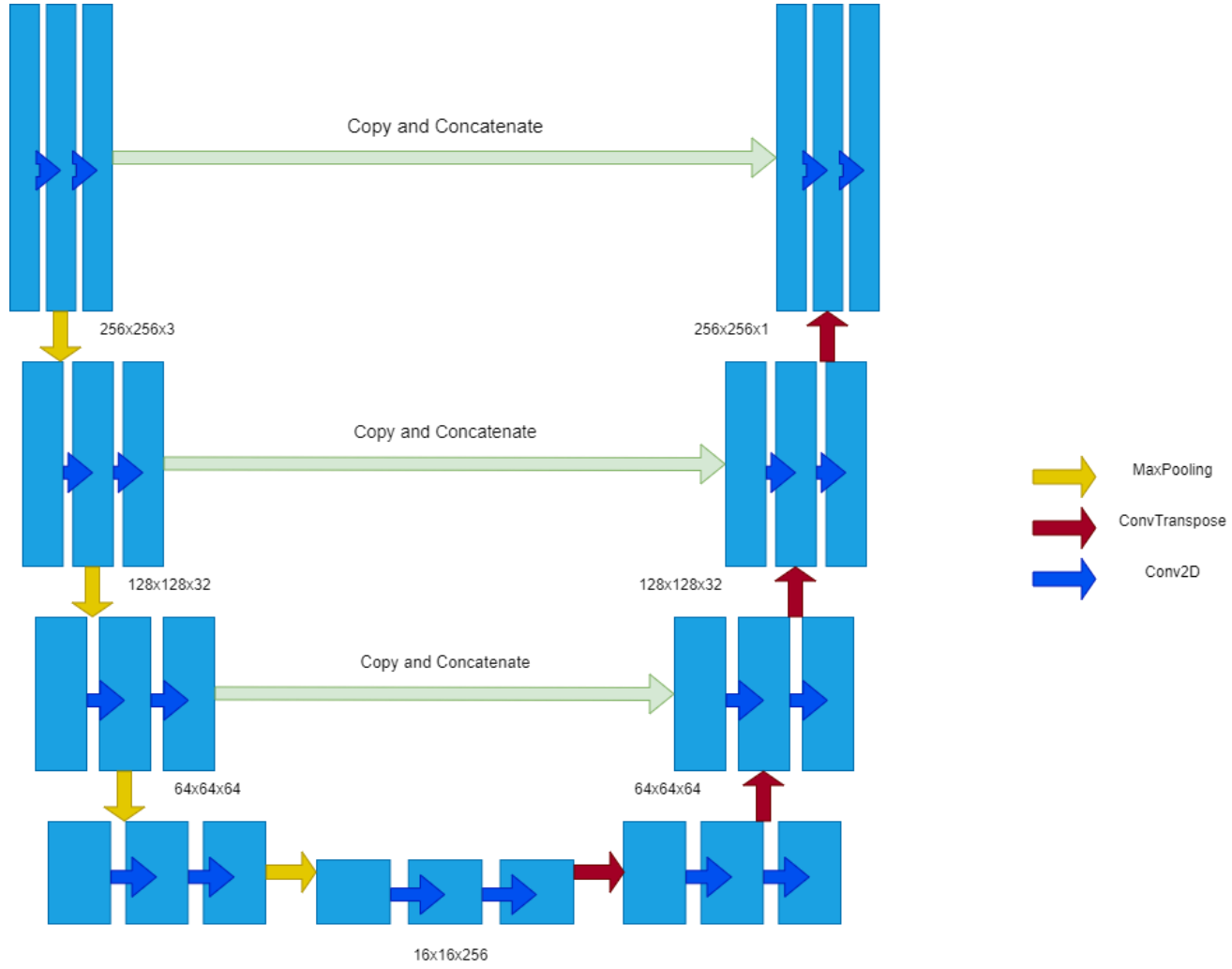
- X_train =1318 elements
- Y_train = 378 elements

DATA AUGMENTATION

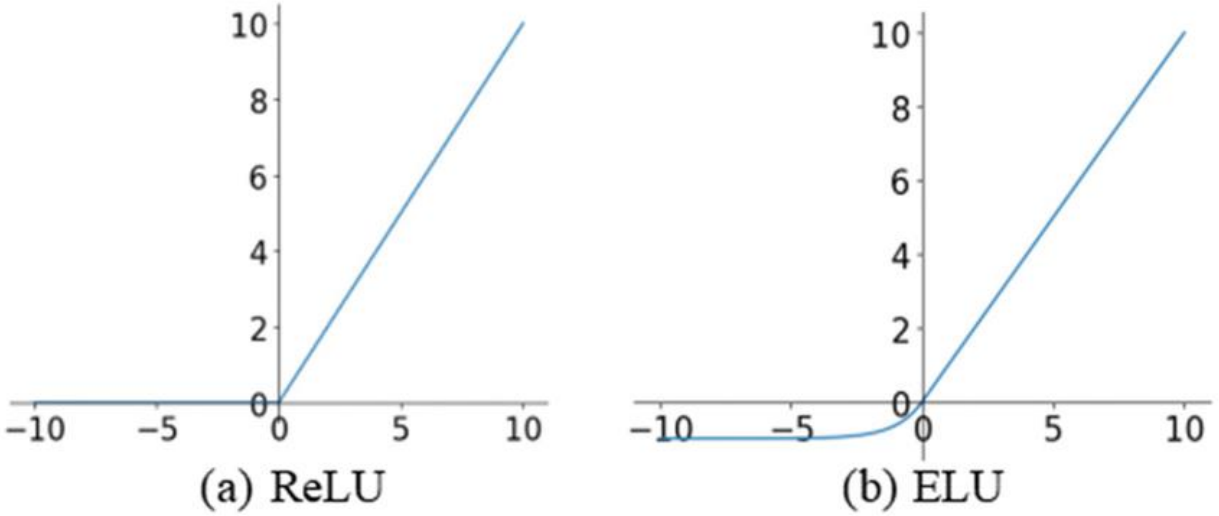


UNET – IMAGE SEGMENTATION

- Activation Function = ELU
- Last Layer Act.Fun.= Sigmoid

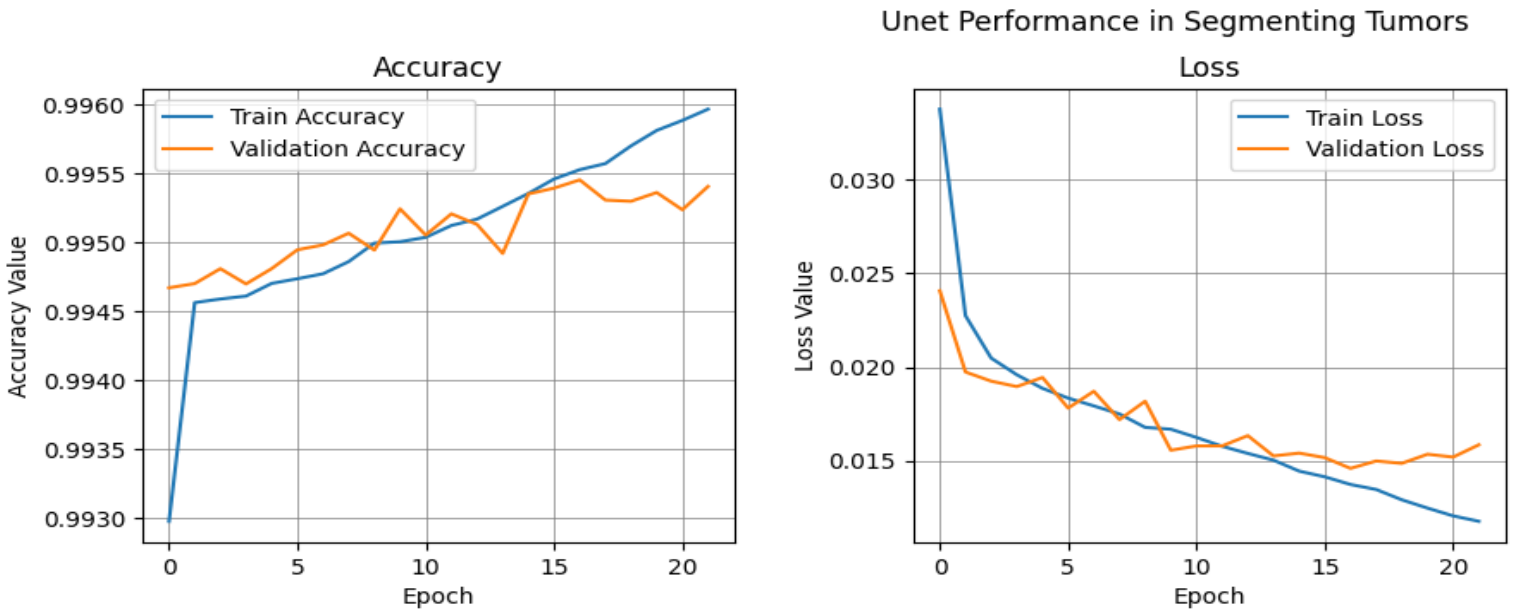


ACTIVATION FUNCTION



The **Exponential Linear Unit** (**ELU**) is an activation function for neural networks. In contrast to ReLUs, ELUs have negative values which allows them to push mean unit activations closer to zero like batch normalization but with lower computational complexity.

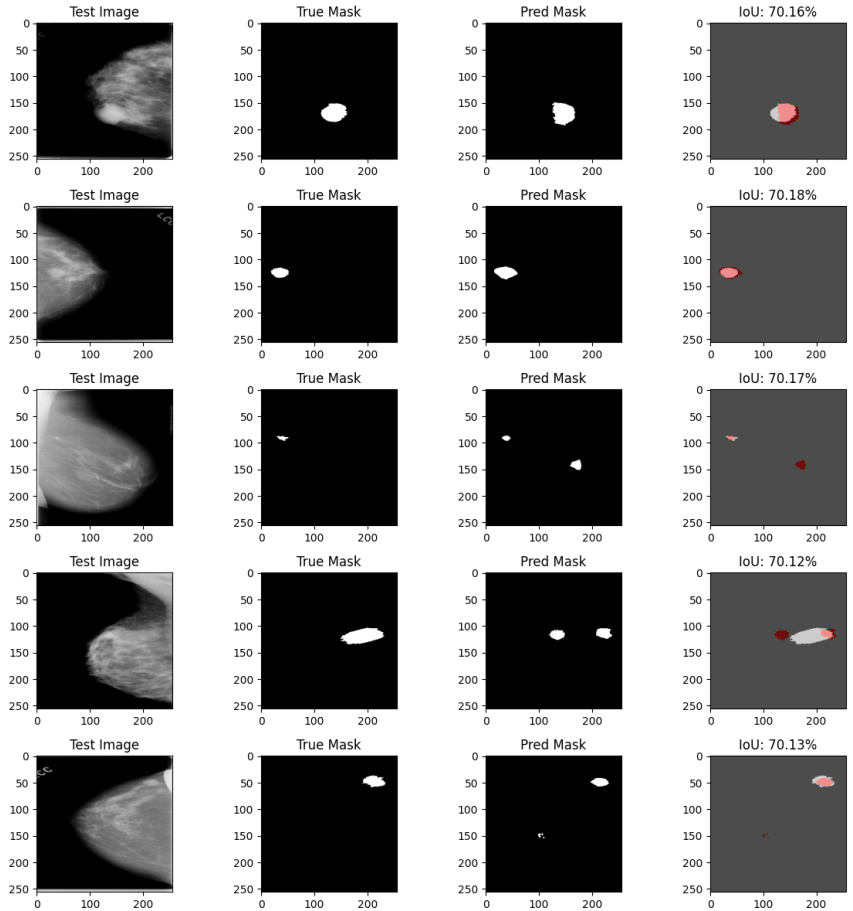
RESULT



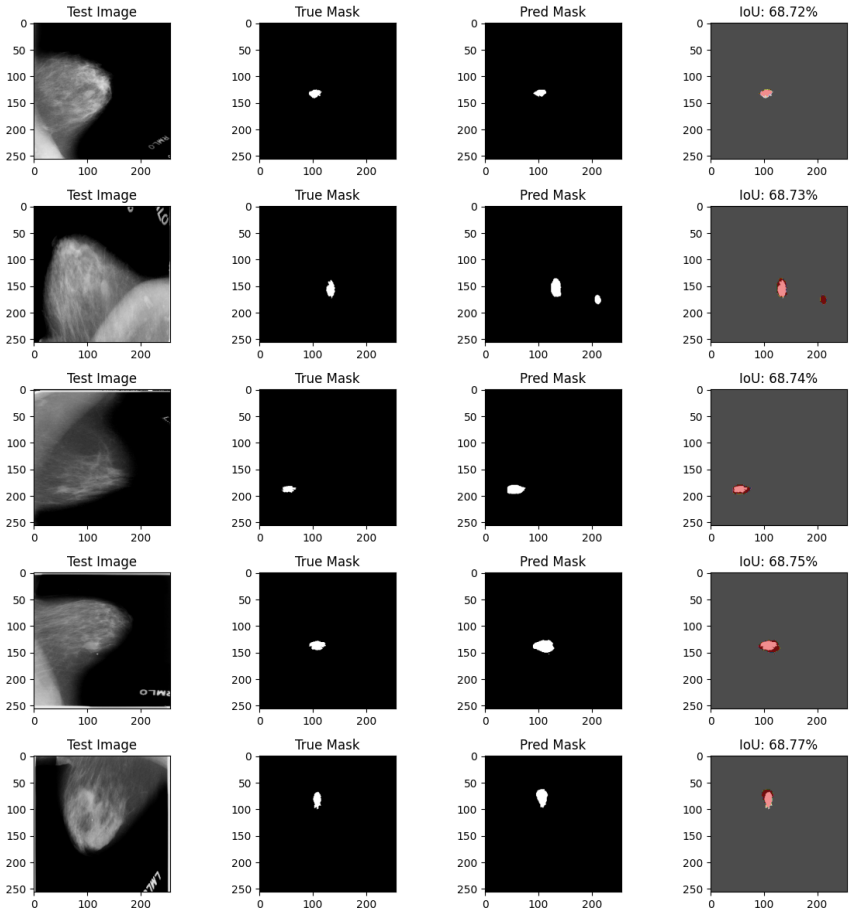
Loss Function = binary_crossentropy
Optimizer = adam
Number of Epochs = 22 (with early stopping)

PREDICTION

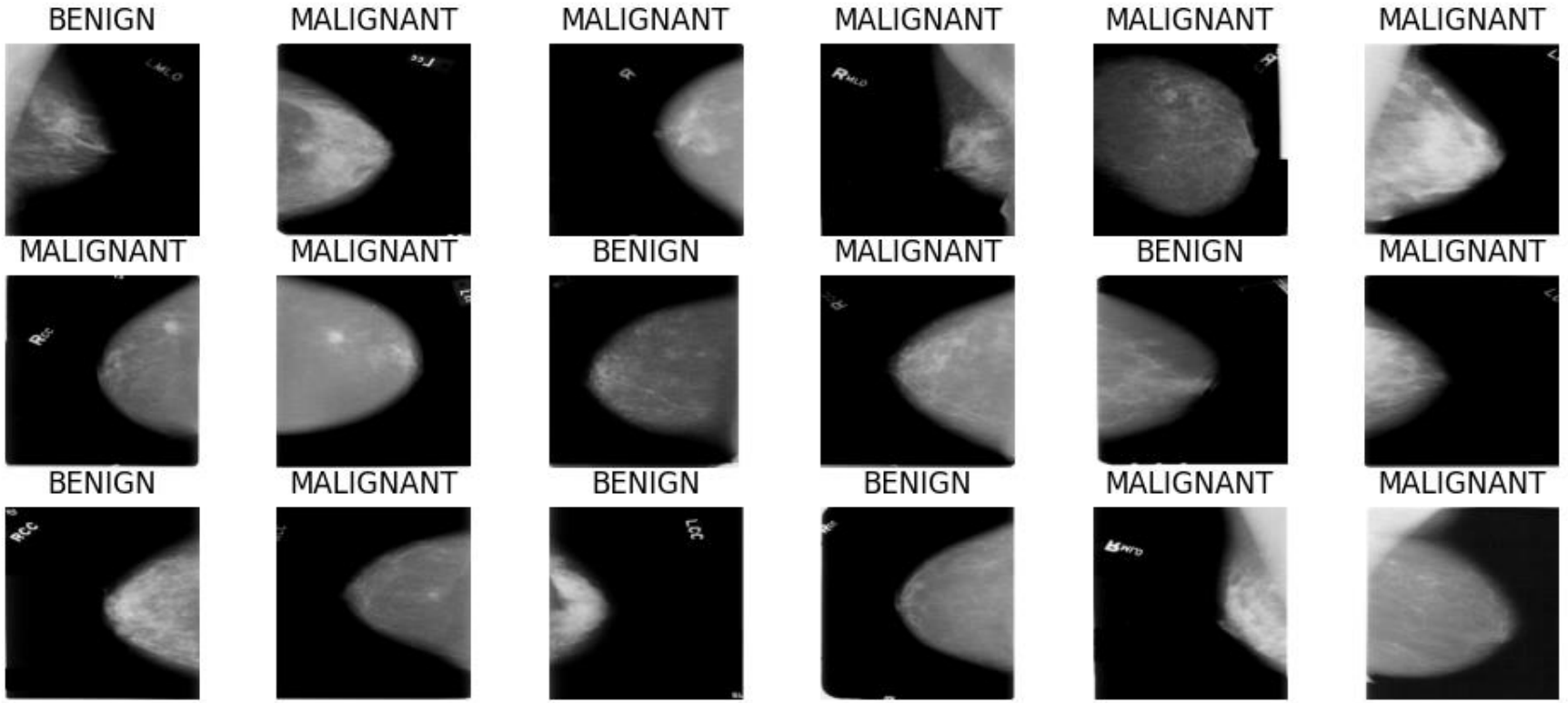
ON TEST SET: IOU = 64%



ON VAL SET IOU = 70%



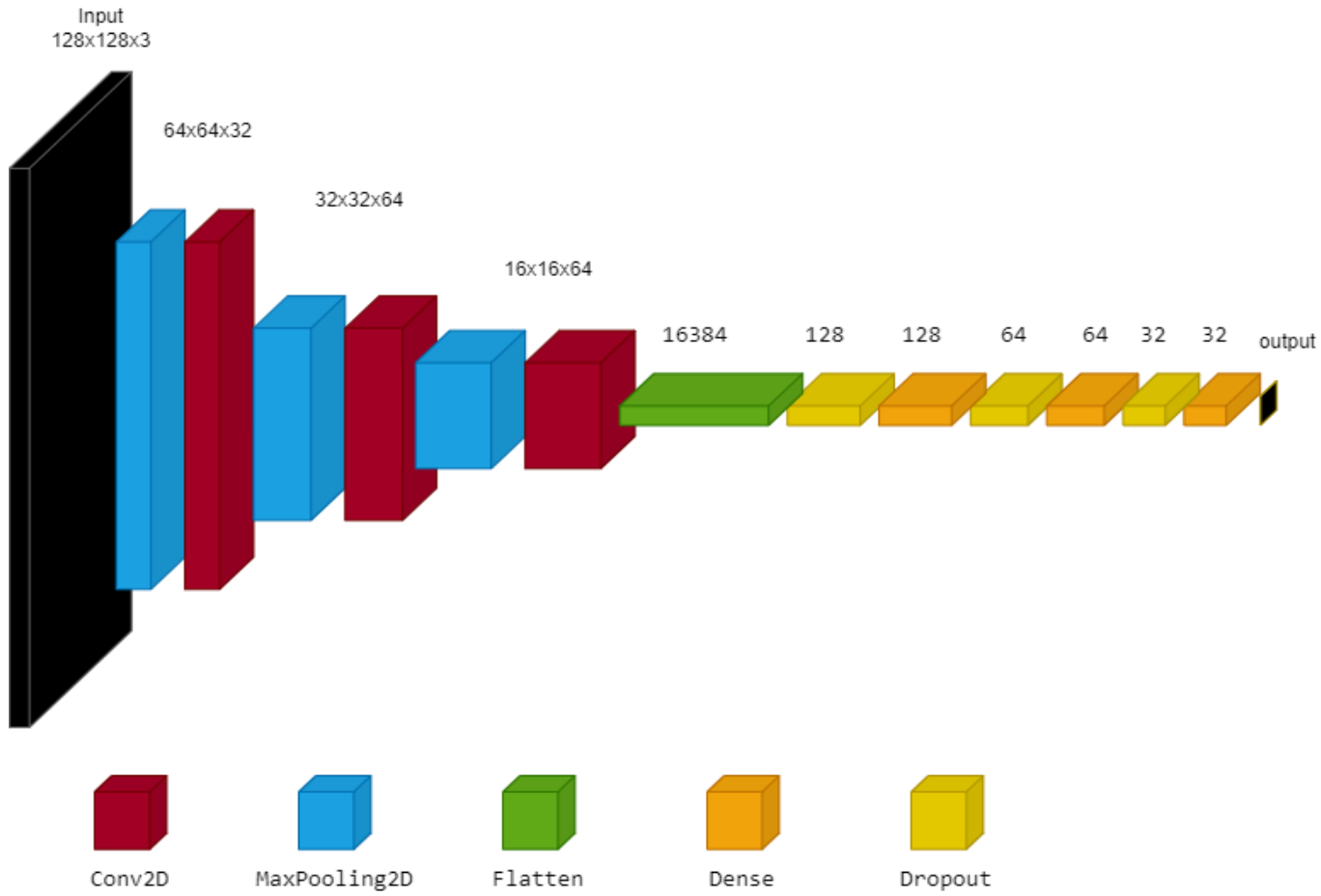
SECOND PROBLEM: BINARY CLASSIFICATION



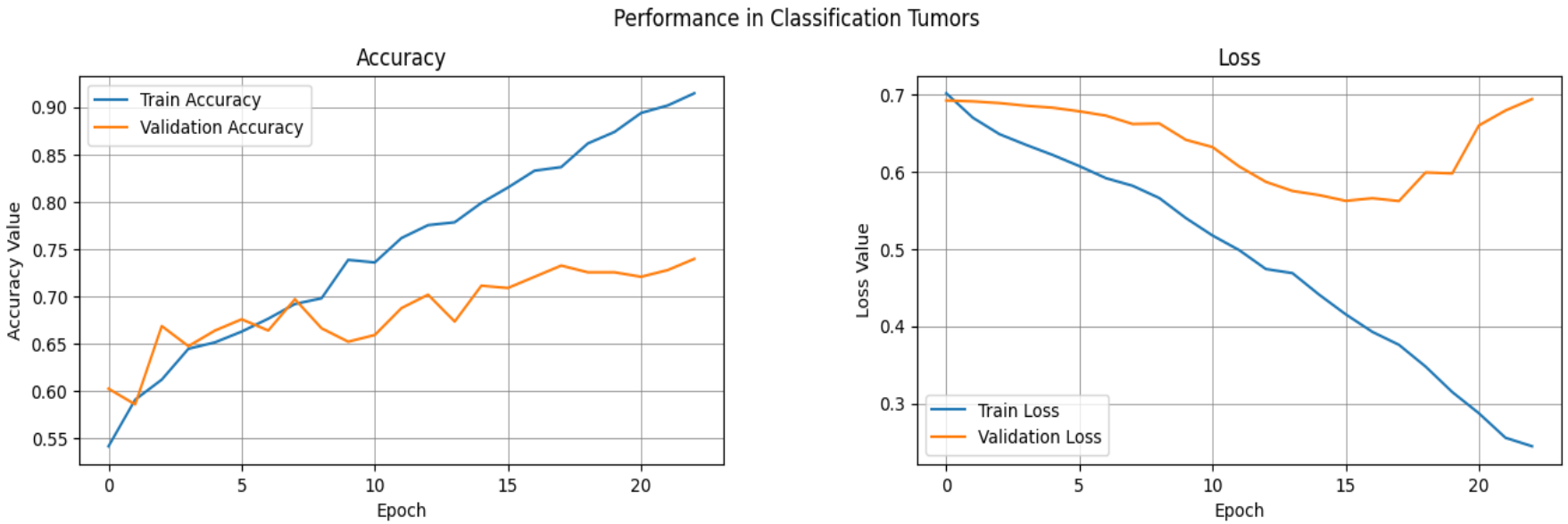
CNN MODEL

- Activation Function = ReLU
- Last Layer Act.Fun.= Softmax

[0,1] = MALIGNANT
[1,0] = BENIGN



RESULT

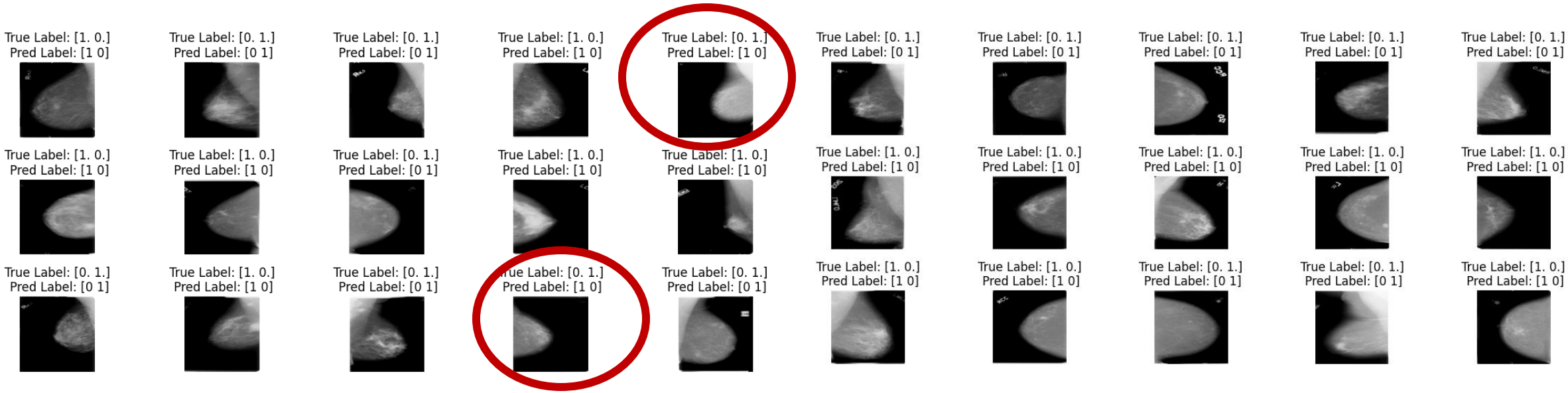


- Loss Function = binary_crossentropy
- Optimizer = Adam(learning_rate = 0.0001)
- ReduceLROnPlateau, to adjust the learning rate during training dynamically
- Number of Epochs = 23 (with early stopping)

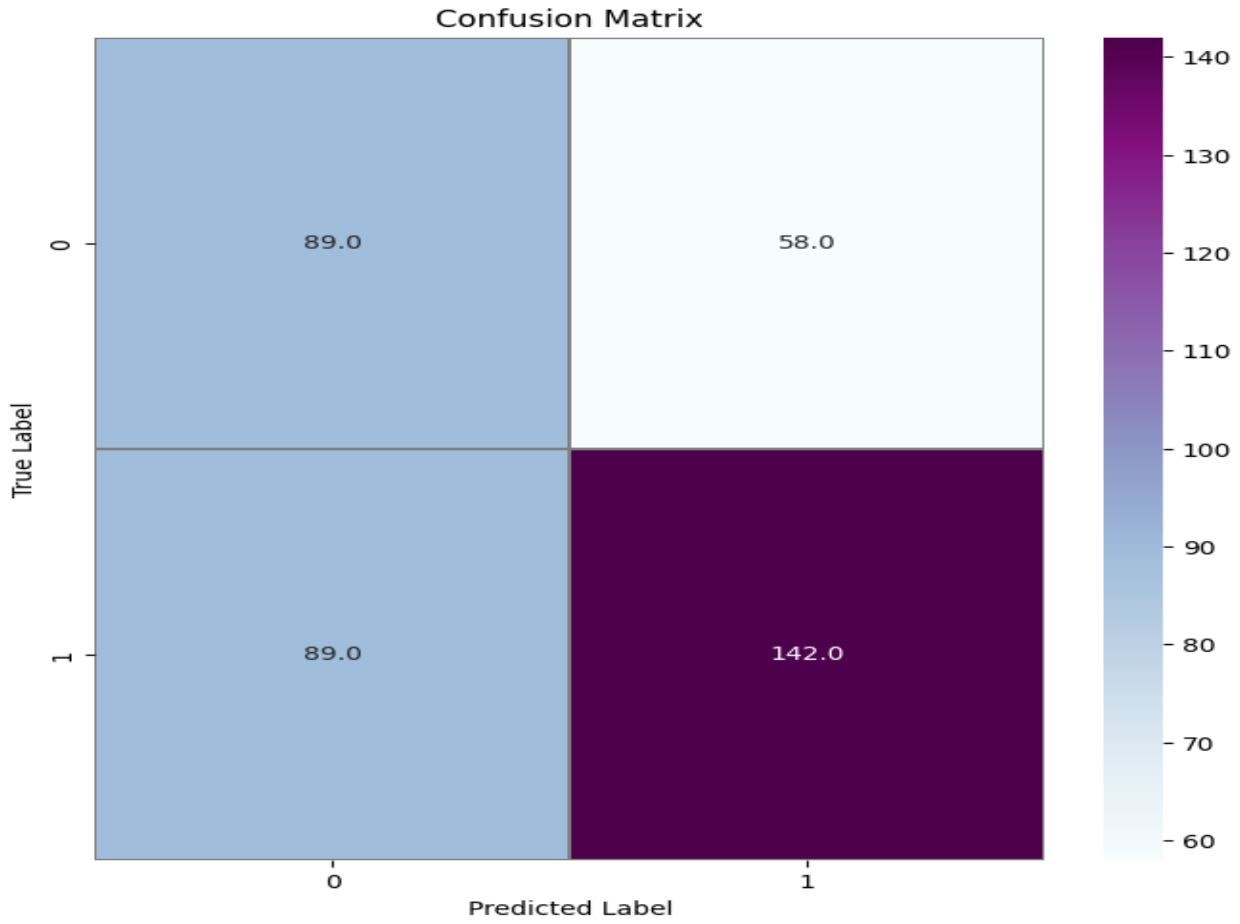
PREDICTION

ON TEST SET: ACCURACY = 64%

ON VAL SET: ACCURACY = 96.78%



CONFUSION MATRIX



REFERENCES

- Dataset = https://www.kaggle.com/datasets/awsaf49/cbis-ddsm-breast-cancer-image-dataset?select=csv
- https://www.kaggle.com/code/ahmedelmoataz/handling-the-dataset-for-cbis-ddsm-mass
- UNet Arch. = https://www.kaggle.com/code/vbookshelf/simple-cell-segmentation-with-keras-and-u-net
- CNN Model = https://github.com/neel-ds/Breast-Cancer-Classification-using-CNN/blob/main/Breast%20Cancer%20Classification%20using%20Deep%20Learning.ipynb