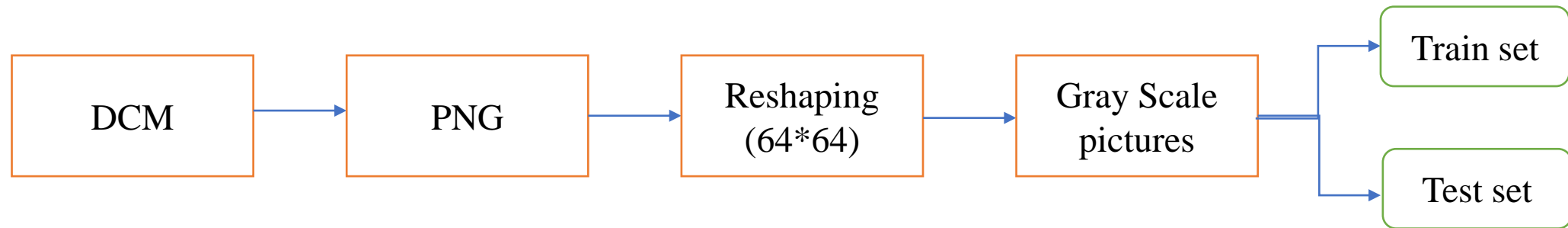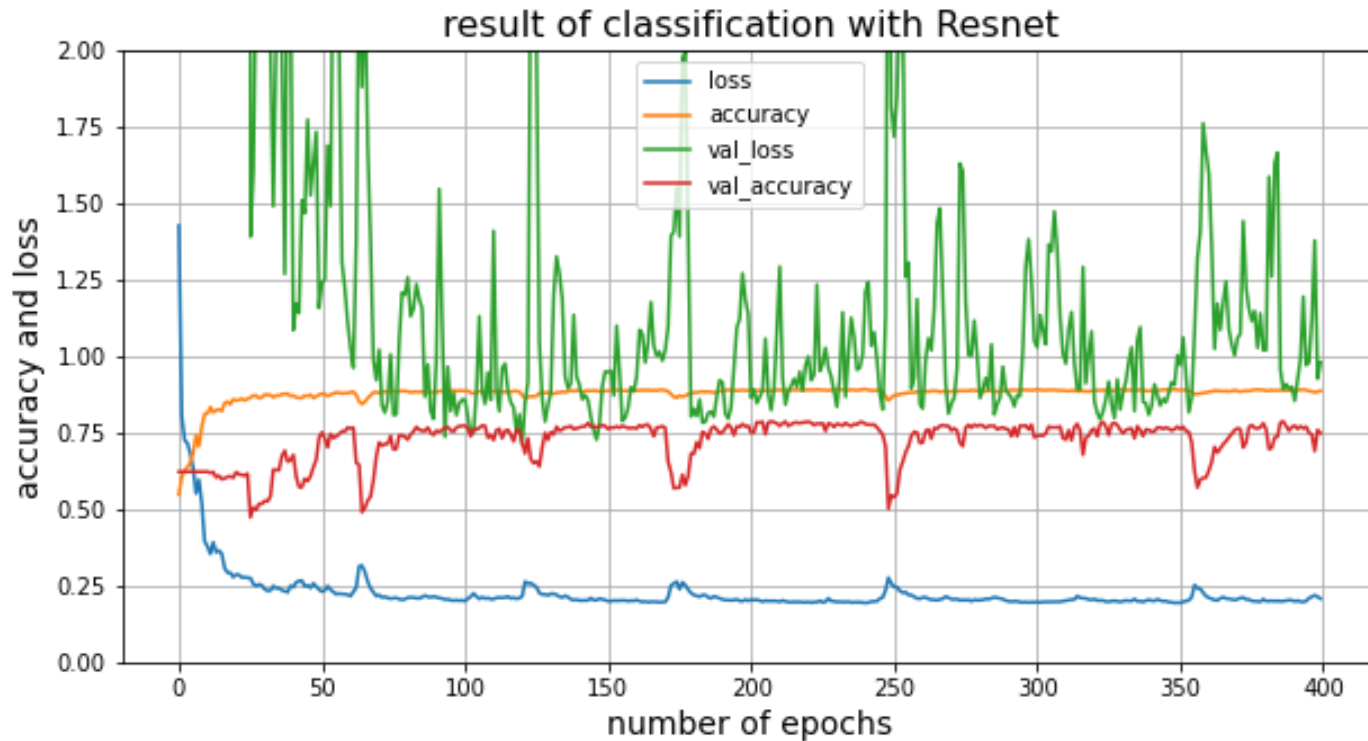# ResNet Model

Result

Train Test preprocessing

- Total number of picture for training here is 19473 pictures.
- Total number of epochs for training is 400 epochs.
- Code have been implemented on 80K GPU.
- Total runtime on GPU for training was 10 hours and 50 minutes.
- Loss function is binary categorical cross entropy loss.

```
DCM → PNG → Reshaping (64*64) → Gray Scale pictures → Train set
                                                      → Test set
```

Accuracy and Loss

result of classification with Resnet
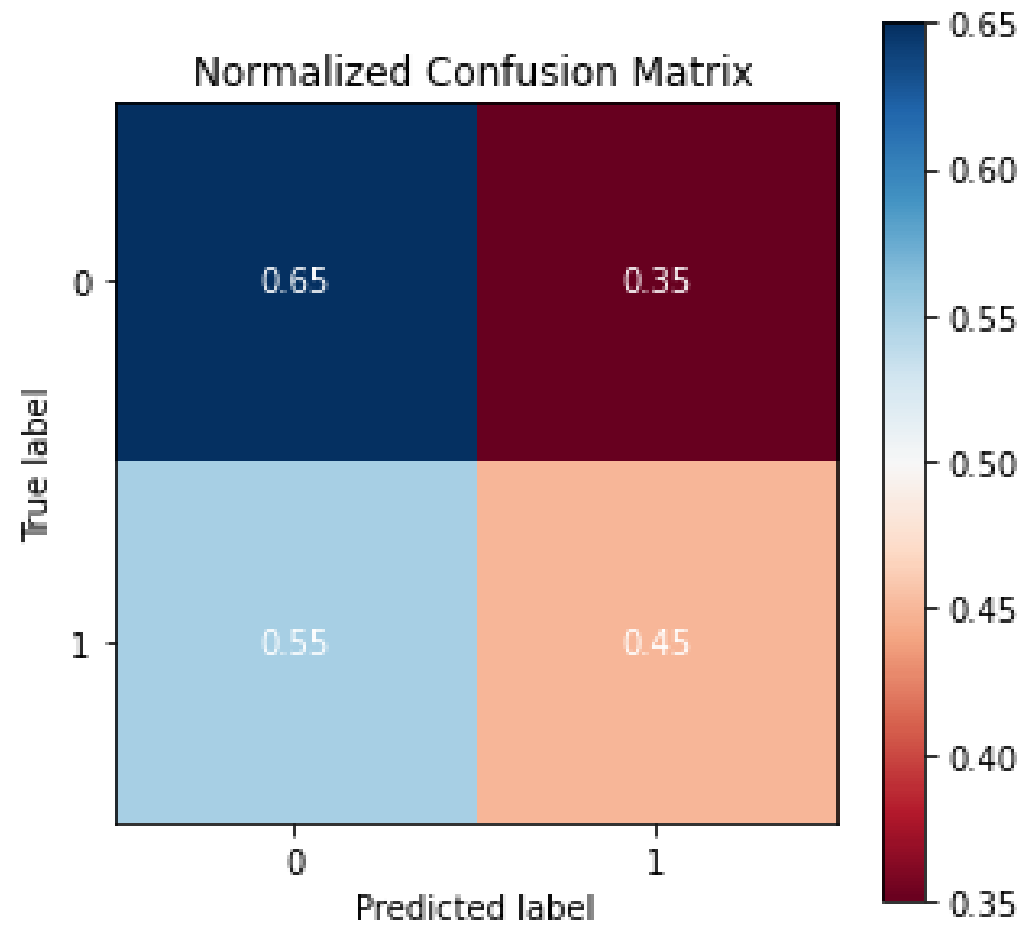
$$y_i = 1 \longrightarrow log\,(\,p\,(y_i))$$

$$y_i = 0 \longrightarrow log\,(\,1 - p(y_i))$$

$$H_p(q) = -\frac{1}{N}\sum_{i=1}^{N} y_i \cdot log(p(y_i)) + (1 - y_i) \cdot log(1 - p(y_i))$$

Training result

- The training accuracy after 400 epochs is 86.83% and loss is 0.2395.

- validation accuracy for validation is stationary after 100 epochs and this accuracy is less than training accuracy.

Testing Result
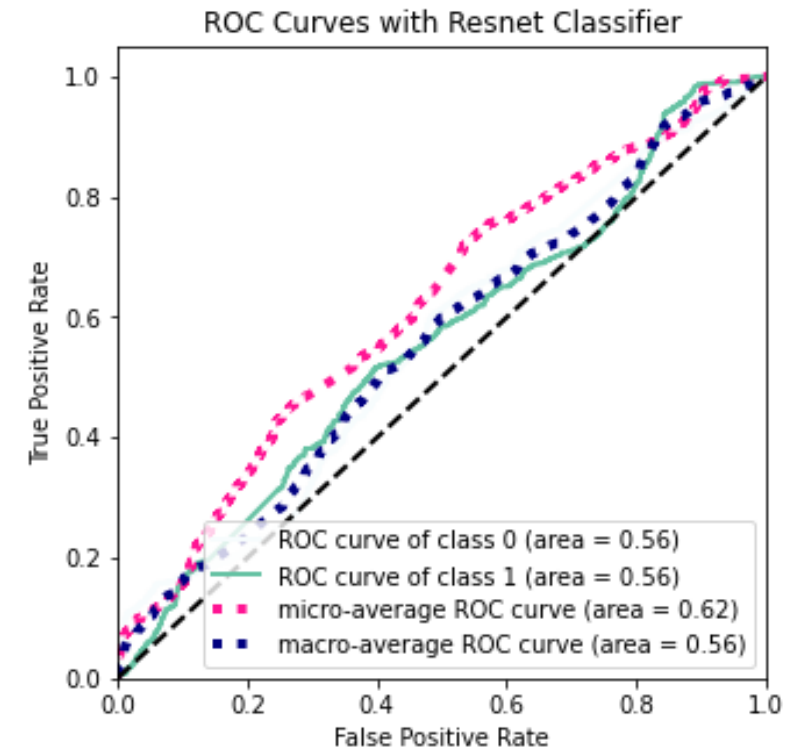

Normalized Confusion Matrix

ROC

$$\text{True Positive Rate} = \text{Sensitivity} = \frac{\text{True Positives}}{\text{True Positives} + \text{False Negatives}}$$

$$\text{False Positive Rate} = (1 - \text{Specificity}) = \frac{\text{False Positives}}{\text{False Positives} + \text{True Negatives}}$$

Test set Accuracy

- Test case accuracy is around 76%.

- Loss based on Binary categorical cross entropy loss is 0.9565.

Test set ROC

ROC Curves with Resnet Classifier

Testing result

- Number of testing instances are 2459.

- Result on ROC and Confusion matrix shown a misclassification behavior on benign tumor class but this is acceptable.

- Testing accuracy is not trustable based on ROC and confusion matrix result.

Discussion

- Resnet have been proven good result on training set.
- Resnet have been evaluated good result at validation set.
- Resnet have been evaluated average result at test set.
- As it has shown here before the result of classification is overfitted.
- Based on confusion matrix classification on patients with malignant tumor is better.