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BSCS 17012

Deep Learning

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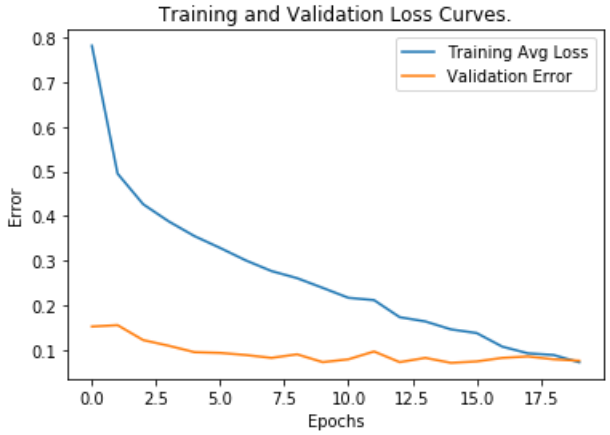
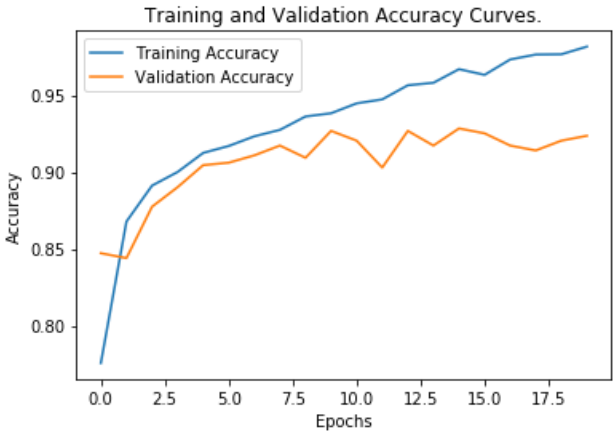
Assignment – 5 Part 2

VGG-16 without Focal Loss

VGG16 with BCE logits loss with **learning rate = 0.00007 momentum = 0.9 batch size = 8.** The FC layers contain three layers. The training accuracy is 98.13% and **Validation Acc = 92.68%.**

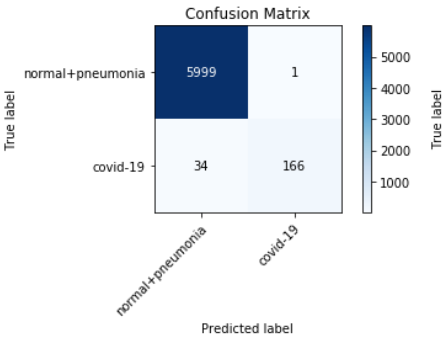
```
F1 Score = [0.79166667 0.95619524 0.91666667]
```

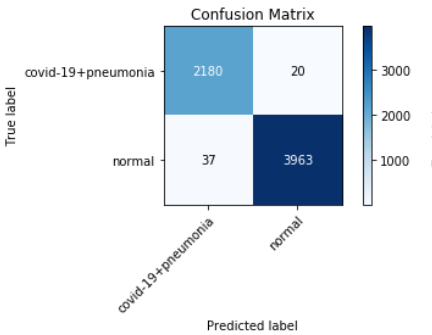


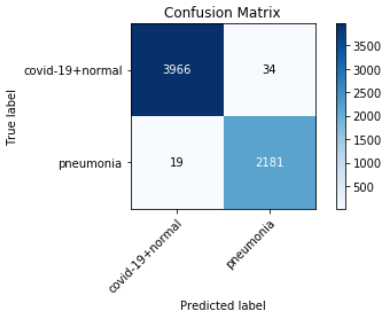


Confusion Matrices:

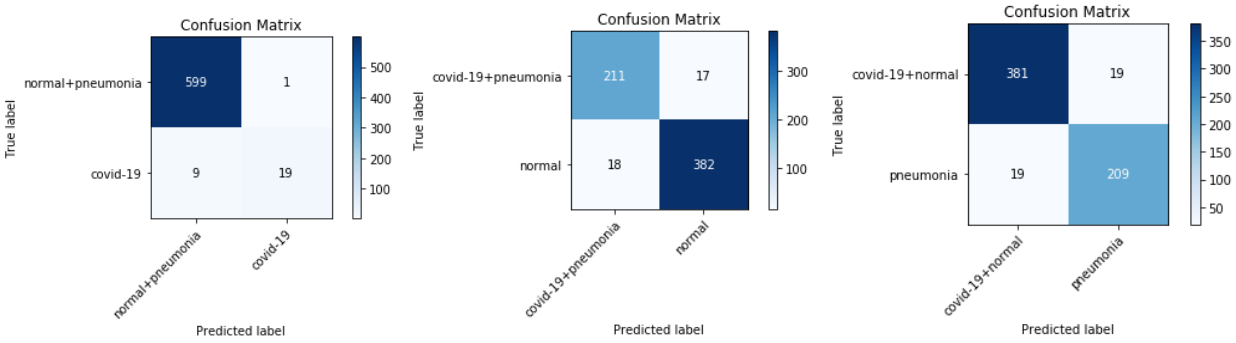
For Training Set







For Validation Set



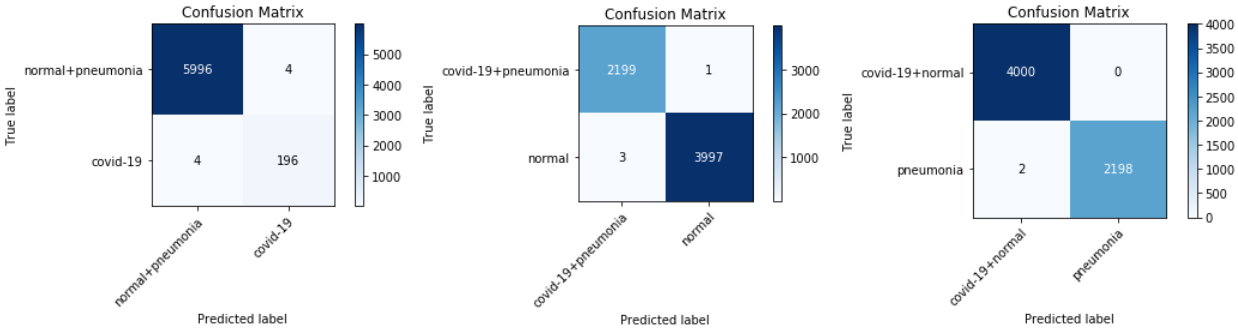
VGG-16 with Focal Loss

VGG16 with focal loss with **learning rate = 0.00007 momentum = 0.9 batch size = 8.** The FC layers contain three layers. The training accuracy is 99.79% and **Validation Acc = 92.83%.**

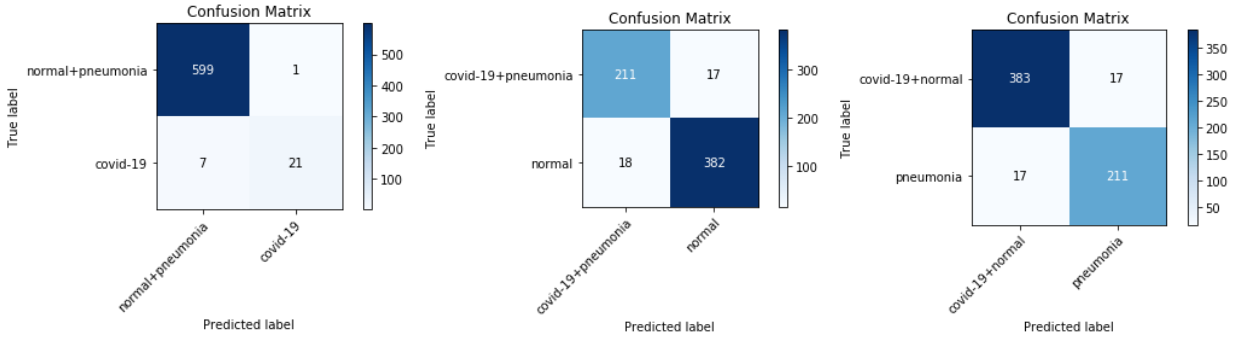
```
F1 Score = [0.84        0.95619524 0.9254386]
```

Confusion Matrices:

For Training Set



For Validation Set

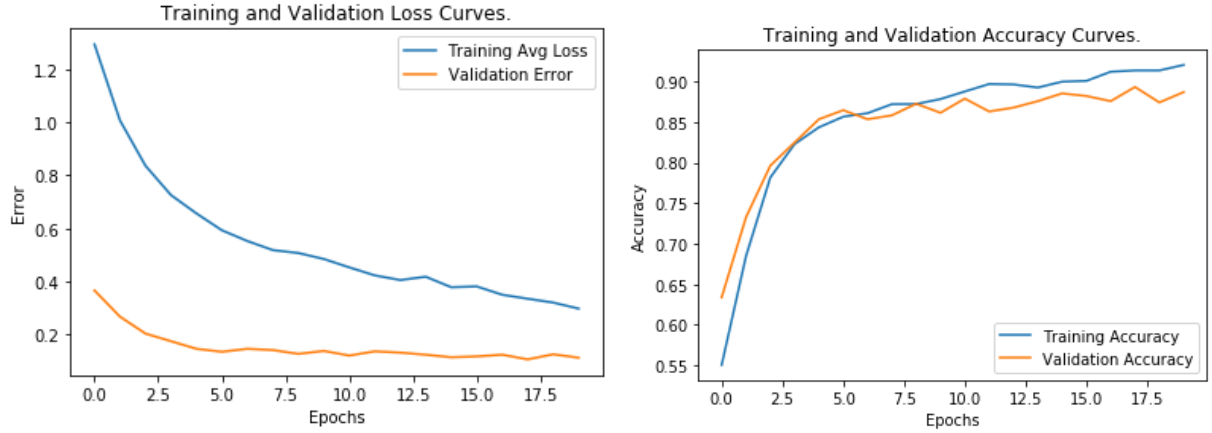


As before focal loss the covid-19 cases whose training data set was very small was not being classified very well but with use of focal loss its accuracy increased too. The accuracy in training data set jumped very much as before focal loss the wrong classifications of the covid-19 in training set was 34 and after focal loss there were only 4 wrong classifications.

ResNet-18 without Focal Loss

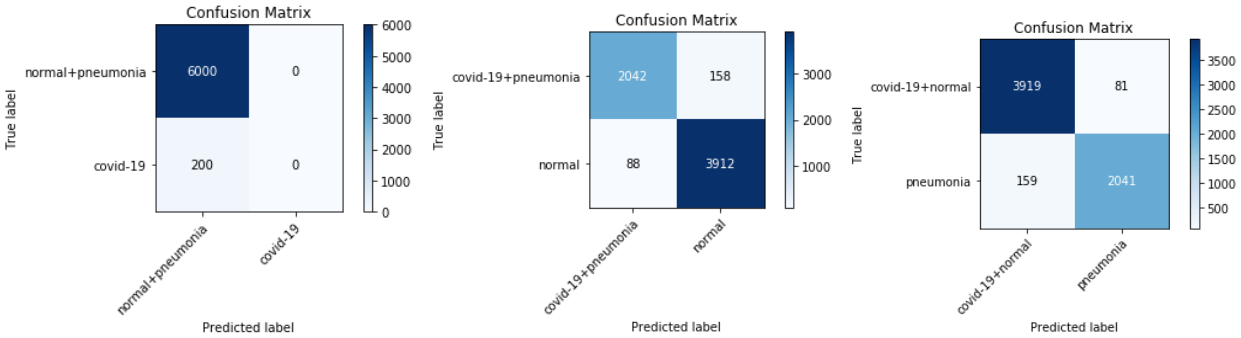
ResNet-18 without focal loss with **learning rate = 0.00007 momentum = 0.9 batch size = 8.** The FC layers contain two layers with (256 and 3 neurons). The training accuracy is 92.55% and **Validation Acc = 89.01%.**

```
F1 Score = [0.          0.94261294 0.89449541]
```

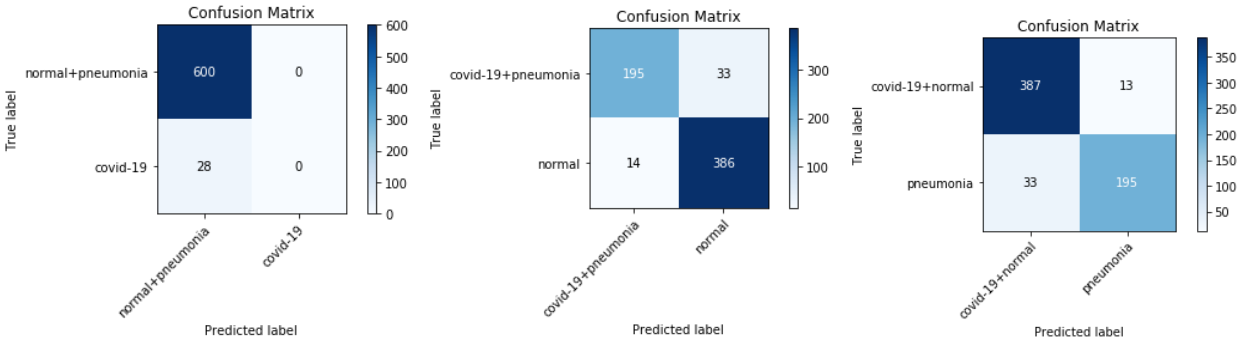


Confusion Matrices:

For Training Set



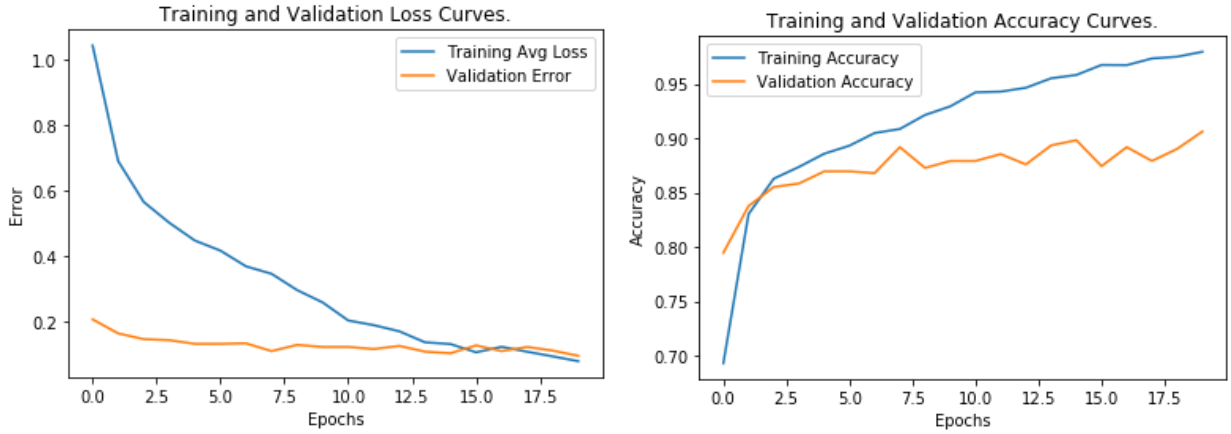
For Validation Set



ResNet-18 with Focal Loss

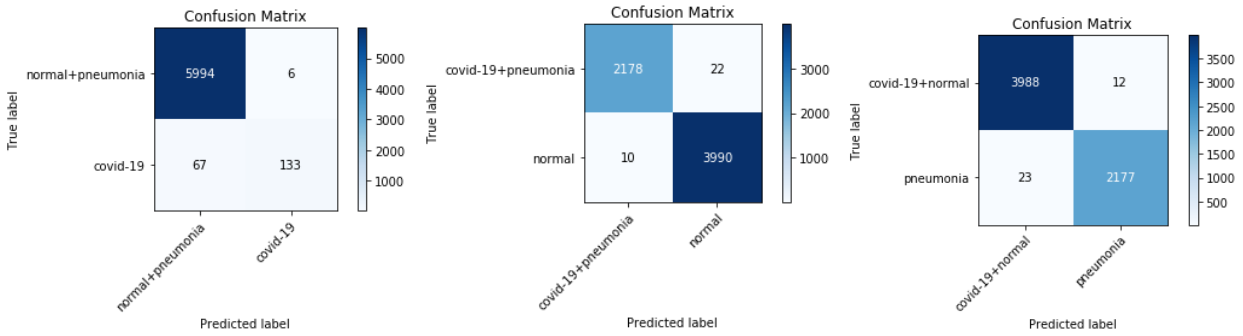
ResNet-18 with focal loss with **learning rate = 0.00007 momentum = 0.9 batch size = 8.** The FC layers contain two layers with (256 and 3 neurons). The training accuracy is 98.23% and **Validation Acc = 89.81%.**

```
F1 Score = [0.6         0.93726937 0.88036117]
```

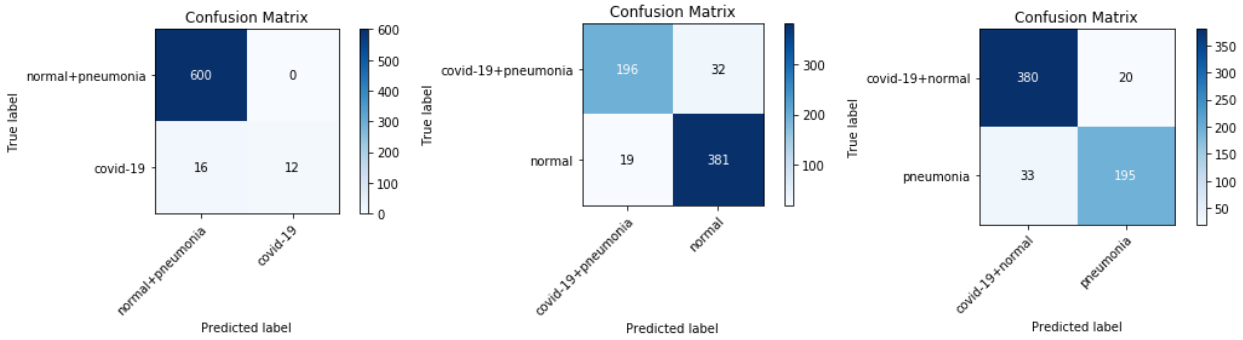


Confusion Matrices:

For Training Set



For Validation Set



In ResNet-18 the difference in much clearer as without focal loss the class which has very few samples that is covid-19 are being not classified as all the covid-19 samples were predicted wrong. But with the use of focal loss the network started to learn the classes with few samples also. As the confusion matrices can be seen the without focal loss validation samples of covid-19 with true predictions were 0 out of 28 but with focal loss these were 12 out of 28. Which is a lot of improvement. This improvement is much larger in training set.