SOBAN ASIF

BSCS16022

Deep Learning

Assignment 5 Part 2

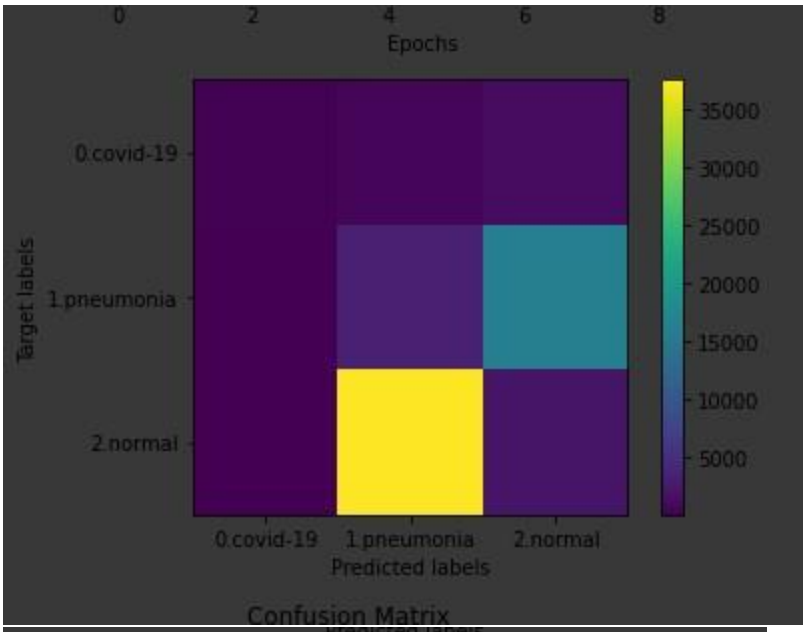
Report

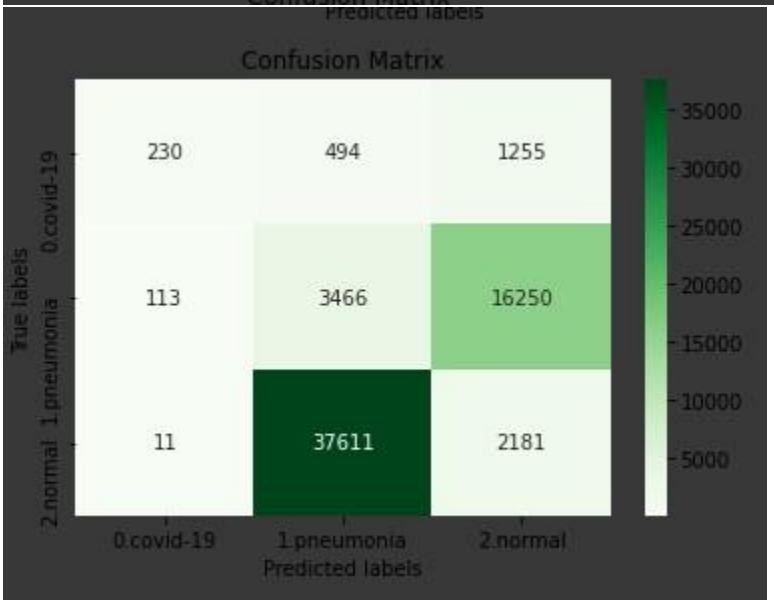
VGG 16

With Focal Loss

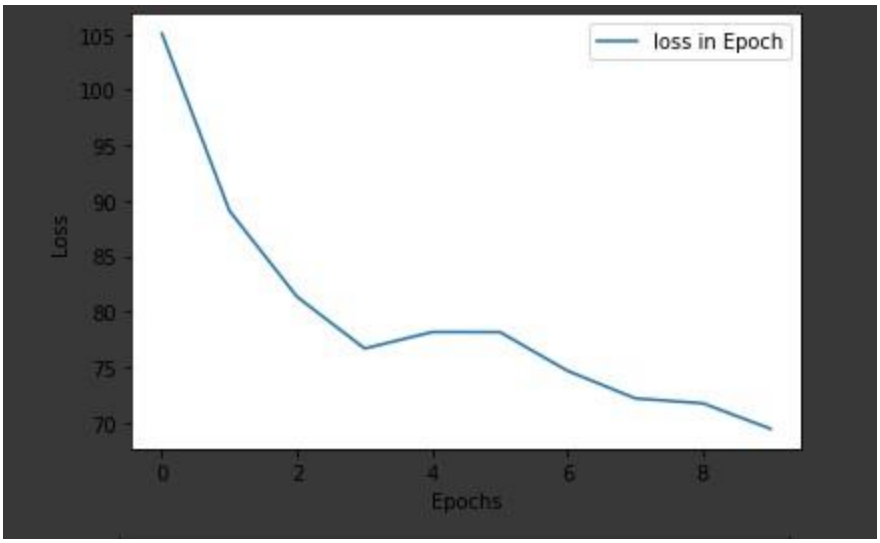
Train:

Confusion Matrix:

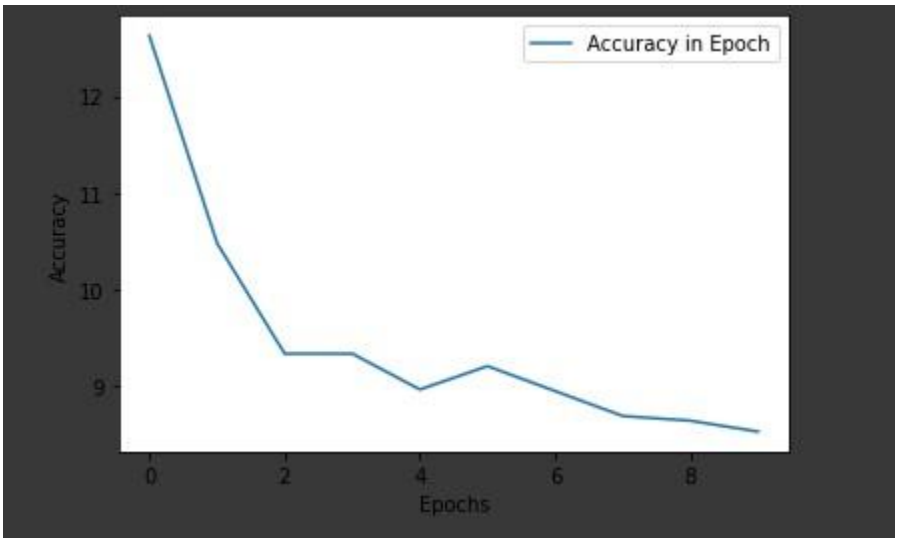

0
2
4
6
8
Epochs
0.covid-19
1.pneumonia
2.normal
Target labels
35000
30000
25000
20000
15000
10000
5000
0.covid-19
1.pneumonia
2.normal
Predicted labels


Confusion Matrix
230
494
1255
113
3466
16250
11
37611
2181
0.covid-19
1.pneumonia
2.normal
True labels
0.covid-19
1.pneumonia
2.normal
Predicted labels
35000
30000
25000
20000
15000
10000
5000

Loss Curve:

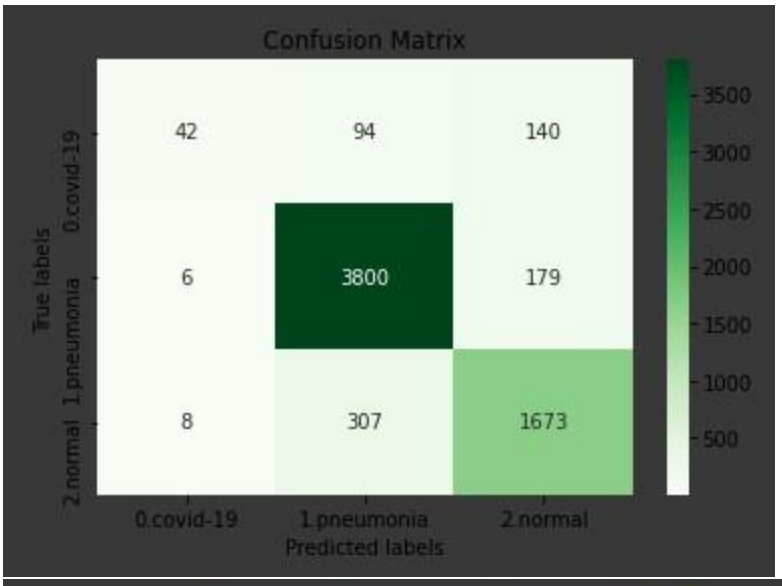


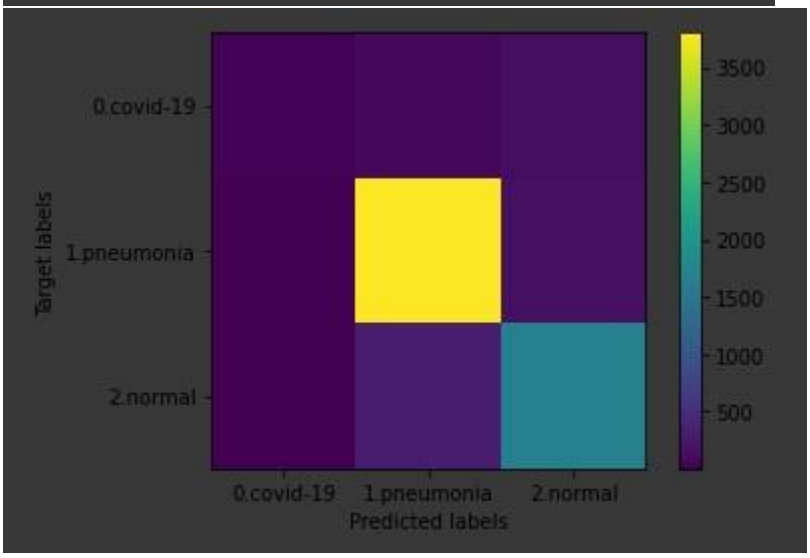
Accuracy Curve:



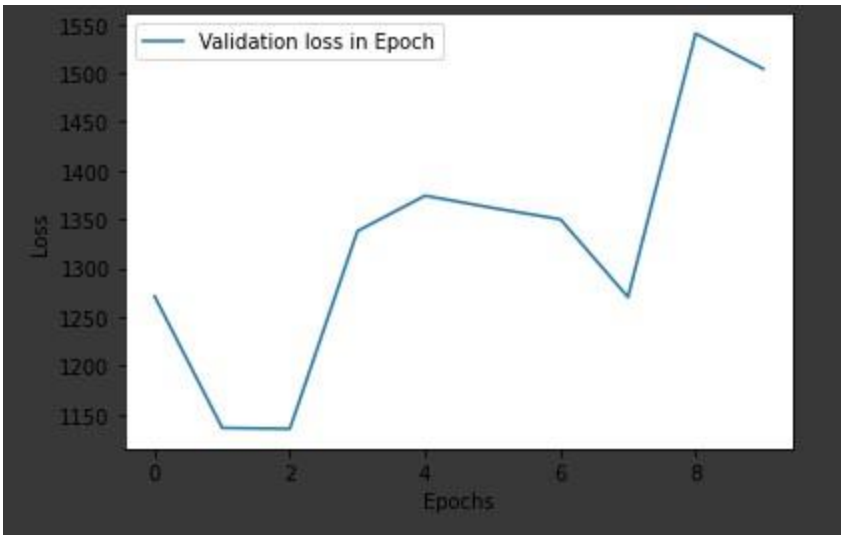
Validation:

Confusion Matrix:

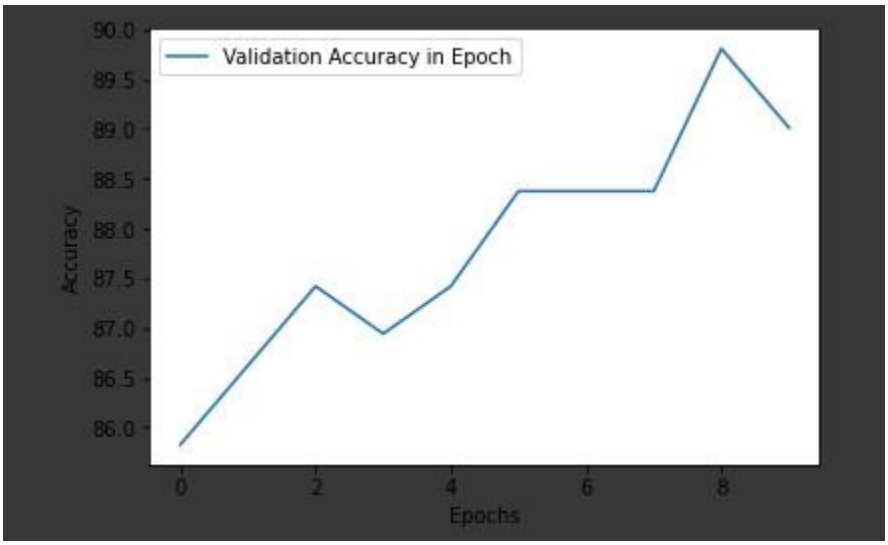

Confusion Matrix
42
94
140
6
3800
179
8
307
1673
True labels
0.covid-19
1.pneumonia
2.normal
0.covid-19
1.pneumonia
2.normal
Predicted labels
3500
3000
2500
2000
1500
1000
500


Target labels
0.covid-19
1.pneumonia
2.normal
0.covid-19
1.pneumonia
2.normal
Predicted labels
3500
3000
2500
2000
1500
1000
500

Loss Curve:



Acuracy Curve:

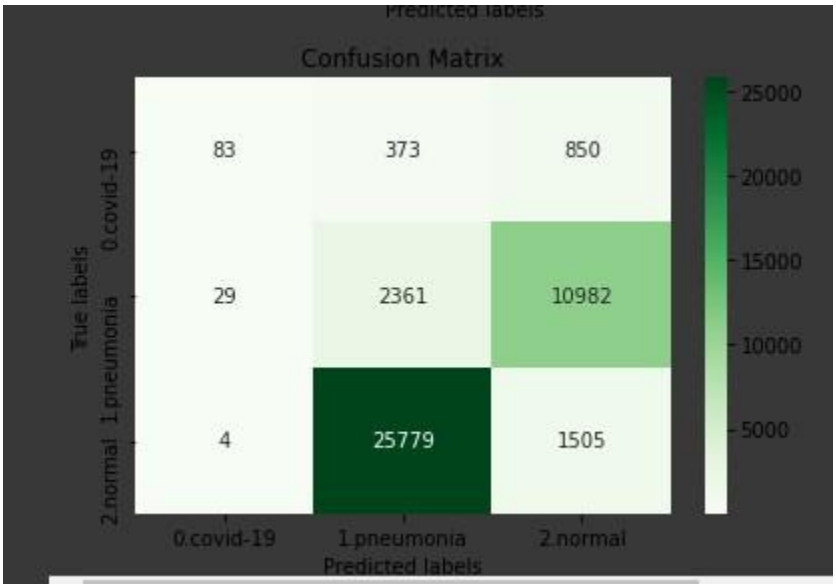


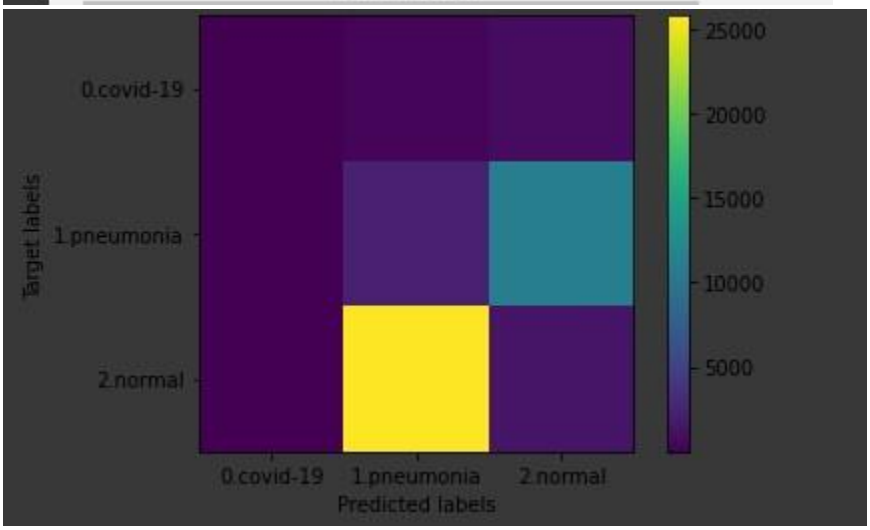
VGG 16

With Focal Loss

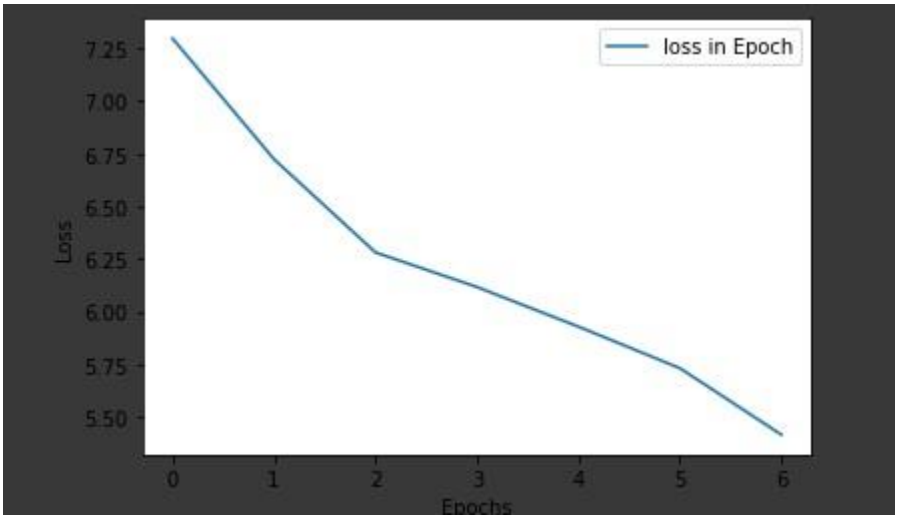
Train:

Confusion Matrix:

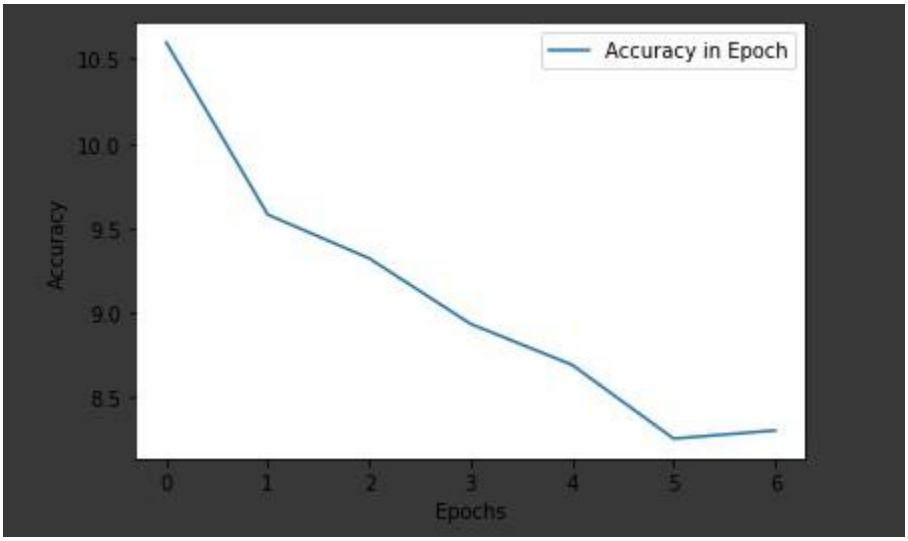




Loss Curve:

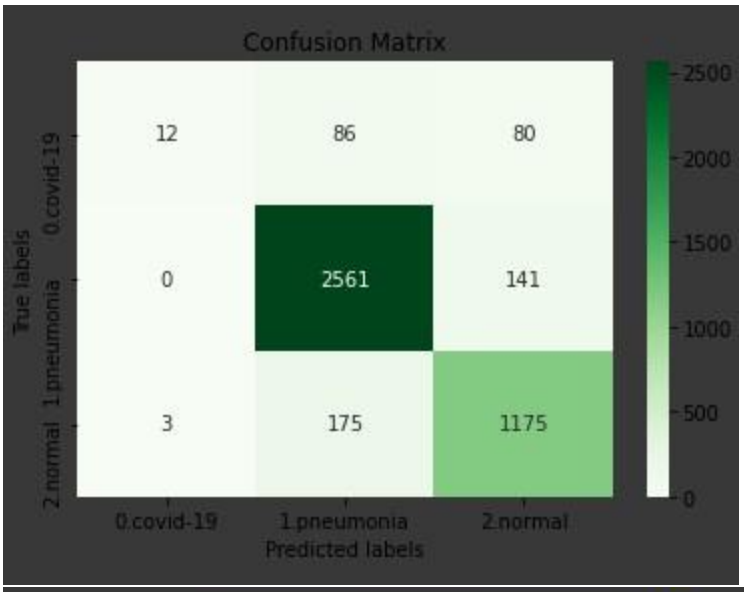


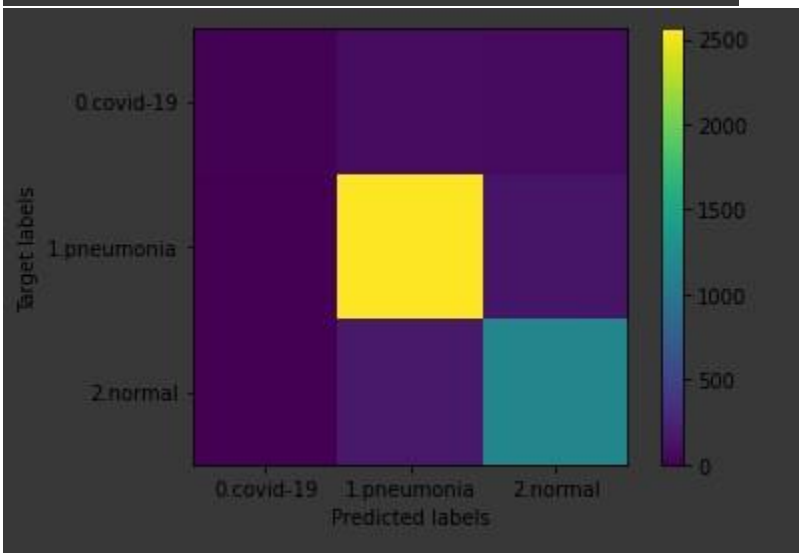
Accuracy Curve:



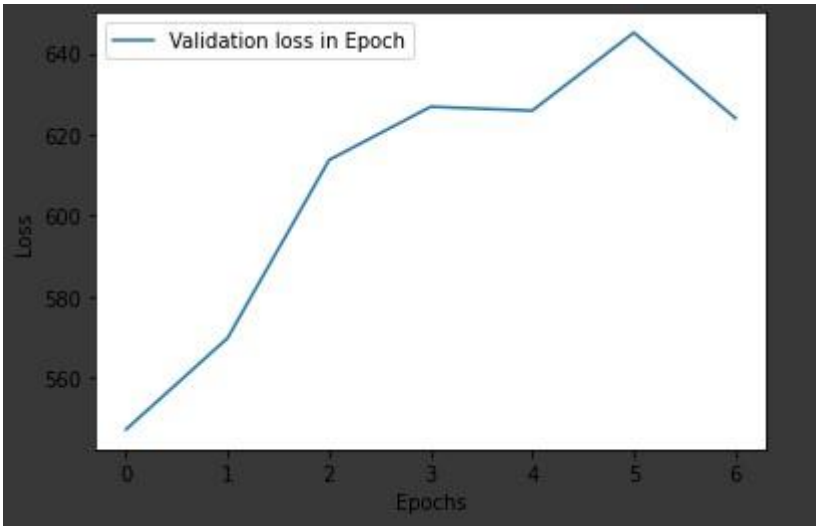
Validation :

Confusion Matrix:

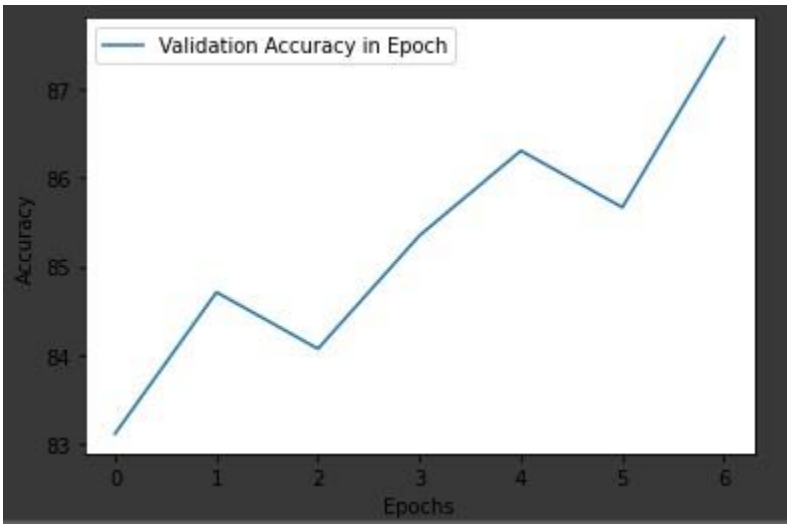

Confusion Matrix
12
86
80
0
2561
141
3
175
1175
0.covid-19
1.pneumonia
2.normal
True labels
Predicted labels
2500
2000
1500
1000
500
0


0.covid-19
1.pneumonia
2.normal
Target labels
Predicted labels
2500
2000
1500
1000
500
0

Loss Curve:



Accuracy Curve:

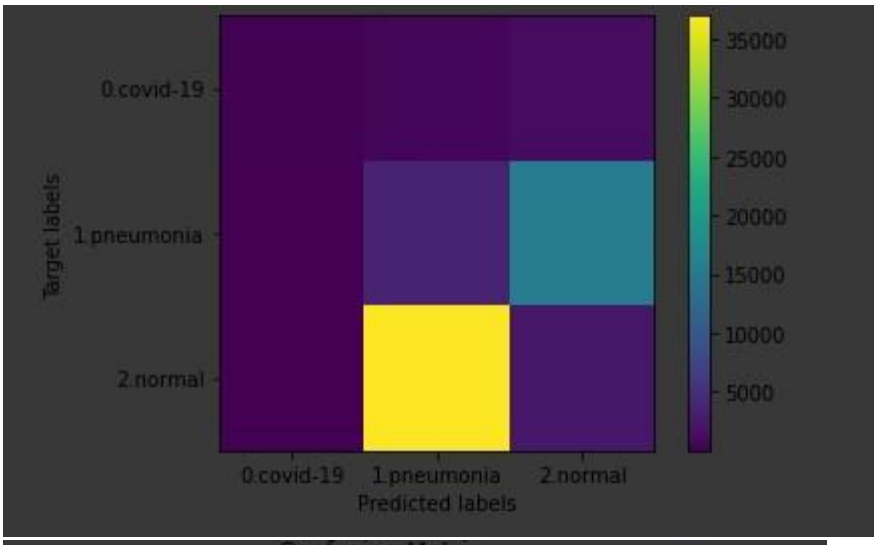


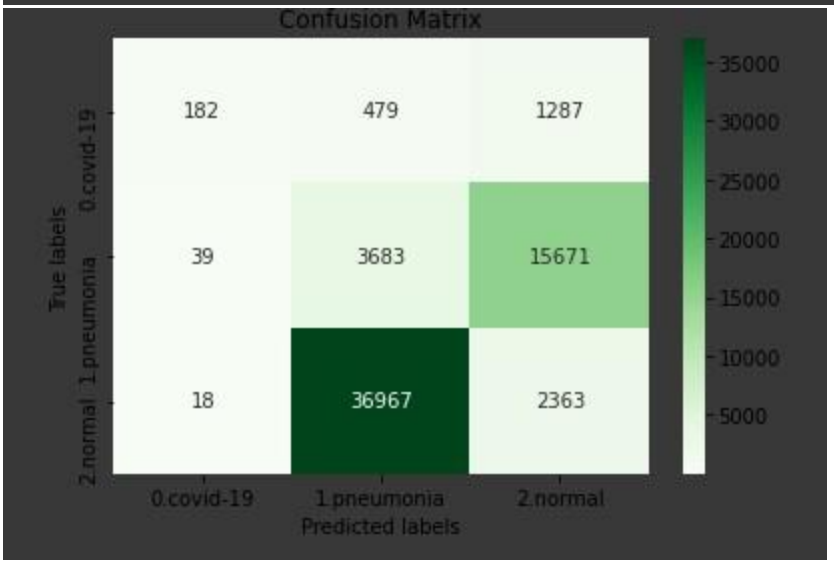
RESNET 18

Without Focal Loss

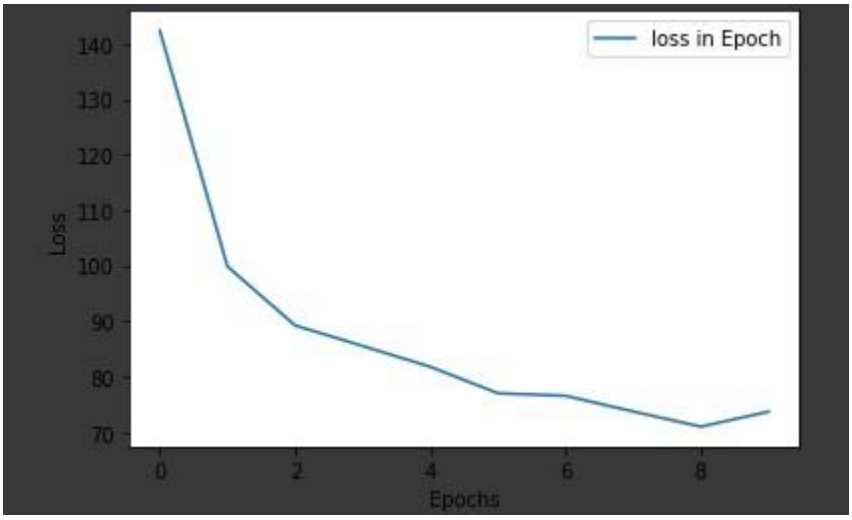
Train:

Confusion Matrix:

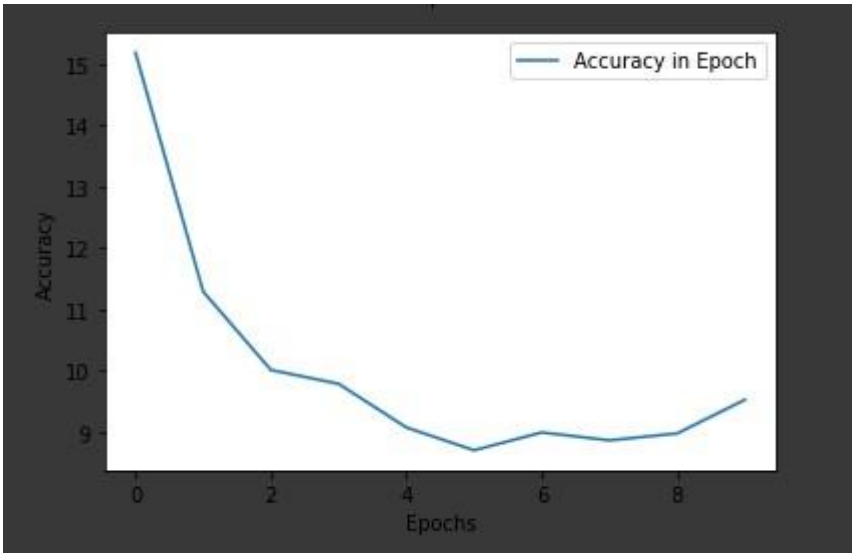




Loss Curve:

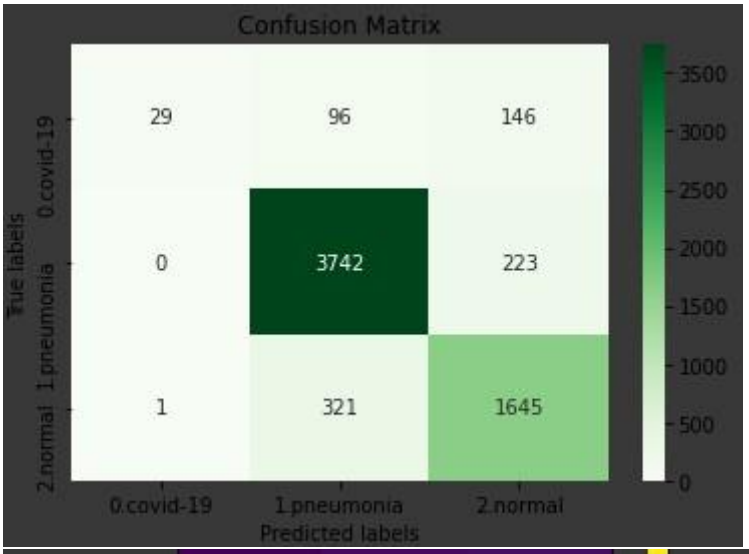


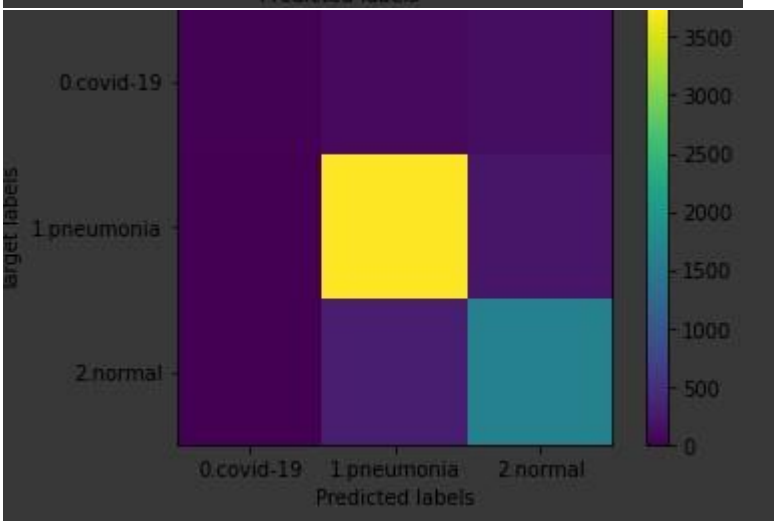
Accuracy Curve:



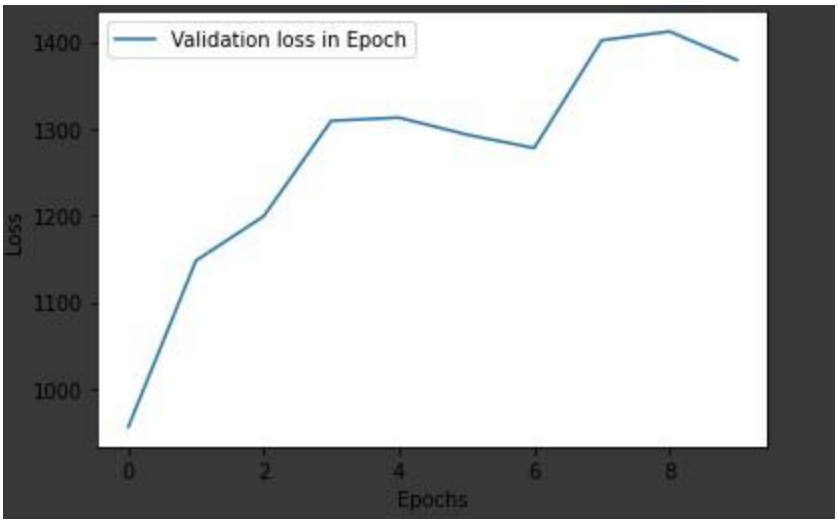
Validation :

Confusion Matrix:

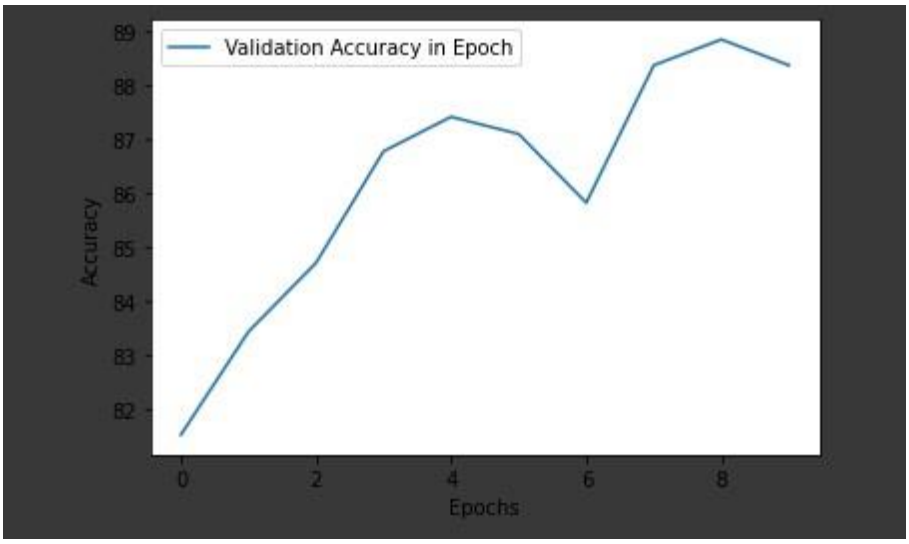




Loss Curve:



Accuracy Curve:

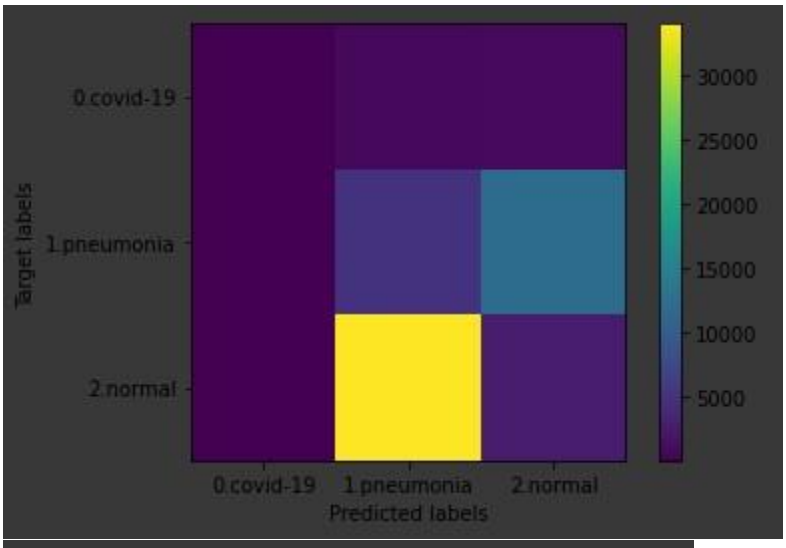


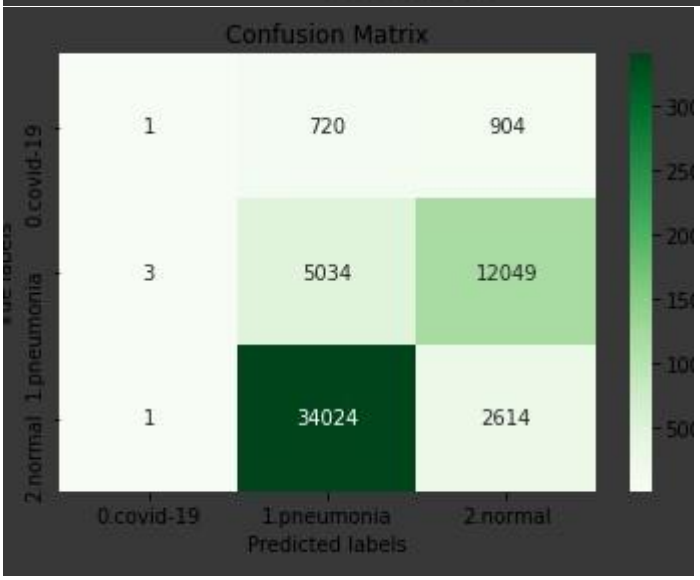
RESNET 18

With Focal Loss

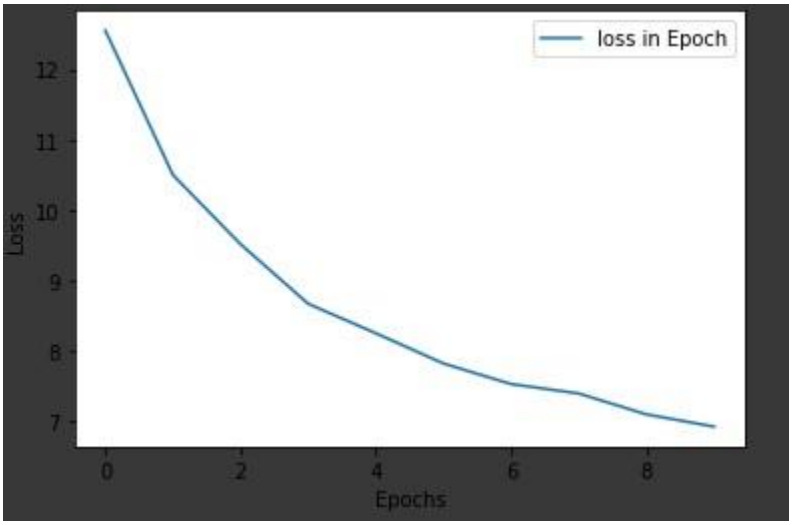
Train:

Confusion Matrix:

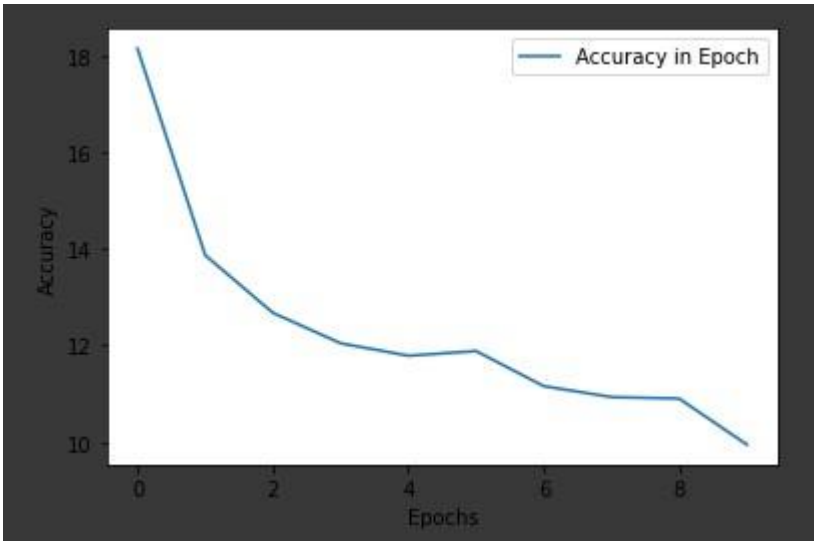

0.covid-19
1.pneumonia
2.normal
Target labels
0.covid-19
1.pneumonia
2.normal
Predicted labels
30000
25000
20000
15000
10000
5000


Confusion Matrix
1
720
904
3
5034
12049
1
34024
2614
0.covid-19
1.pneumonia
2.normal
0.covid-19
1.pneumonia
2.normal
Predicted labels

Loss Curve:


loss in Epoch
Loss
12
11
10
9
8
7
0
2
4
6
8
Epochs

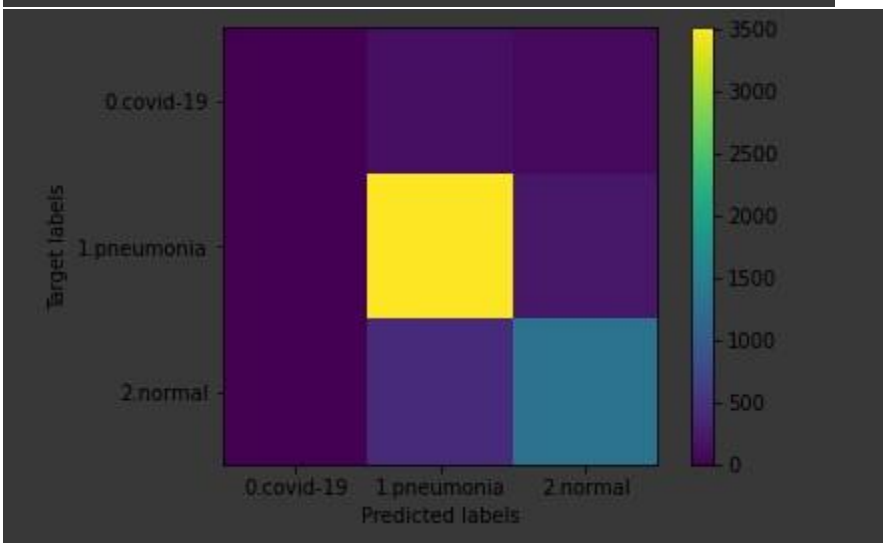
Accuracy Curve:



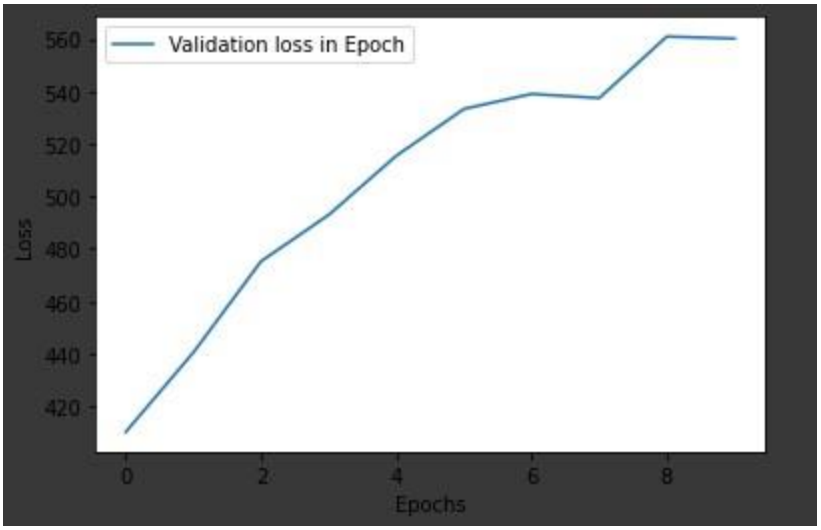
Validation :

Confusion Matrix:

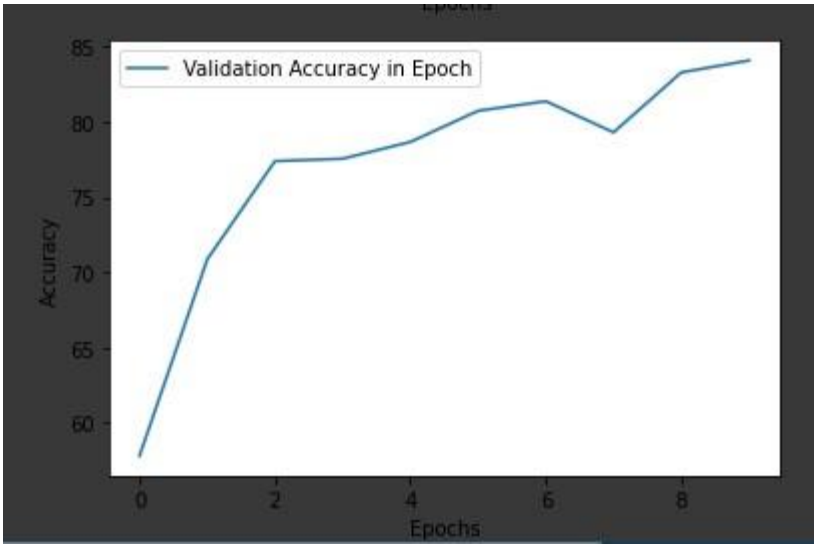

Confusion Matrix
0
140
92
0
3506
227
1
428
1336
True labels
0.covid-19
1.pneumonia
2.normal
0.covid-19
1.pneumonia
2.normal
Predicted labels
3500
3000
2500
2000
1500
1000
500
0


0.covid-19
1.pneumonia
2.normal
Target labels
0.covid-19
1.pneumonia
2.normal
Predicted labels
3500
3000
2500
2000
1500
1000
500
0

Loss Curve:


Validation loss in Epoch
560
540
520
500
480
460
440
420
Loss
0
2
4
6
8
Epochs

Accuracy Curve:



GITHUB REPOSITORY LINK

Link :

Final Accuracy = 92%

F1 Score = 0.9417

Experimental Setup

Learning Rate = 0.001

Momentum = 0.9

Alpha = 0.24

Gamma = 2.1

Labels = One-hot-Encoded

Number of layers finetuned = 20

Without Focal Loss, the Loss was pretty high i.e average 0.4. After using the Focal Loss the loss was down to an average of 0.06. I got the best results by fine tuning all the layers.