

Assignment 5 Part 2 Report

Github Link

https://github.com/Ahmad-Saleem-264/MSDS-18026_COVID19_DLSpring2020

VGG Focal Loss

<https://drive.google.com/open?id=1wVMeZ9ac2i8a3mjCBQ7RZLIX7kiaxbE->

ResNet Focal Loss

<https://drive.google.com/open?id=1SjwAEyf-R0SsfUYpMLT6NDhoO-cd36Hv>

VGG BCE

<https://drive.google.com/open?id=1-4a-7zKaegsgq7r3DRhwa3EmLadz2uaA>

Resnet BCE

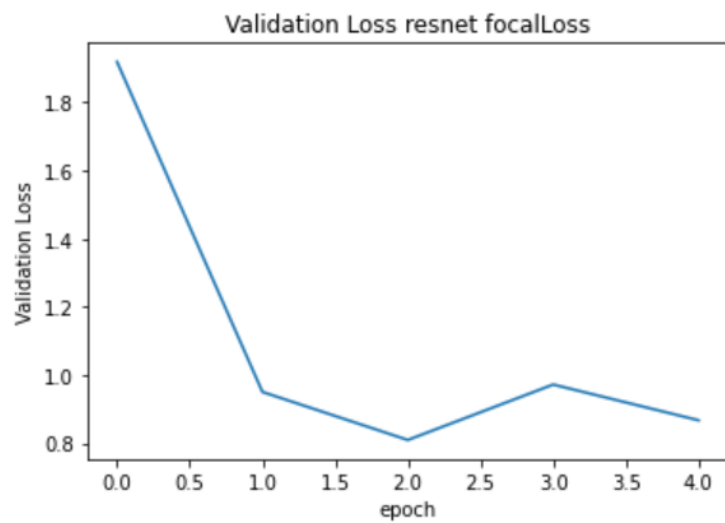
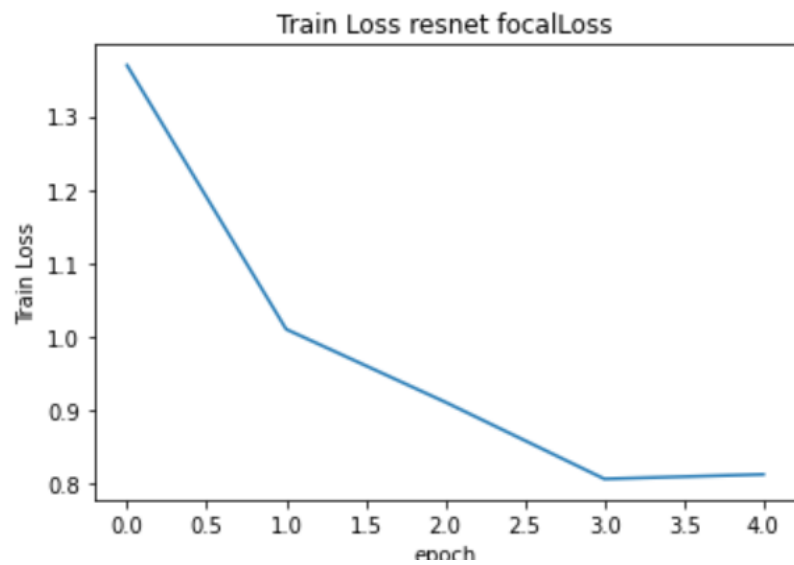
https://drive.google.com/open?id=1-1Hk-O_DlkkMTFNgX_MsfnfwHtNIOftH

Analysis: while using focal loss the loss was higher as compared to BCE but accuracy of Focal loss was higher than BCE. The difference in accuracy is not much significant but accuracy in class wise accuracy is very much significant as per shown in F1 score and confusion matrixes. Resnet failed to classify covid cases with BCE however vgg showed a bit improved class wise performance with BCE. With focal loss both the performance of vgg and resnet increased. It is important to mention that while applying focal loss you should apply softmax otherwise it will start making every class output to be 1 as it will also decrease loss but is incorrect.

Focal Loss Resnet with 2 FC layer

Epoch=5

lr=0.001, momentum=0.9



Confusion Matrix Test

	Covid	Normal	Pneumonia
Covid	132	38	30

Normal	8	3856	136
Pneumonia	44	379	1577

Validation Confusion Matrix

	Covid	Normal	Pneumonia
Covid	22	5	1
Normal	2	390	8
Pneumonia	13	23	164

Accuracy on validation=91 %

F1 score Validation

Covid	Normal	Pneumonia
0.676	0.953	0.879

F1 score Train

Covid	Normal	Pneumonia
0.68	0.93	0.84

BCE Loss Resnet with 2 FC layer

Epoch=5

lr=0.001, momentum=0.9

Confusion Matrix Test

	Covid	Normal	Pneumonia
Covid	0	61	139
Normal	0	3834	166

Pneumonia	0	395	1605
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Confusion Matrix Validation

	Covid	Normal	Pneumonia
Covid	0	18	10
Normal	0	380	20
Pneumonia	0	24	176

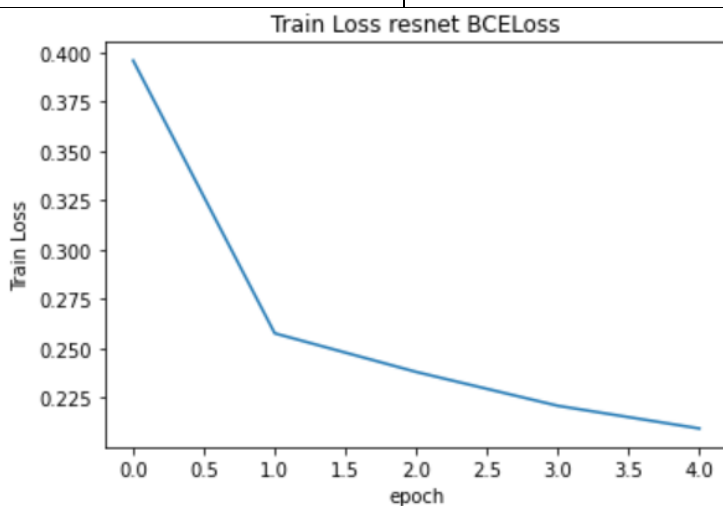
Accuracy on validation=87%

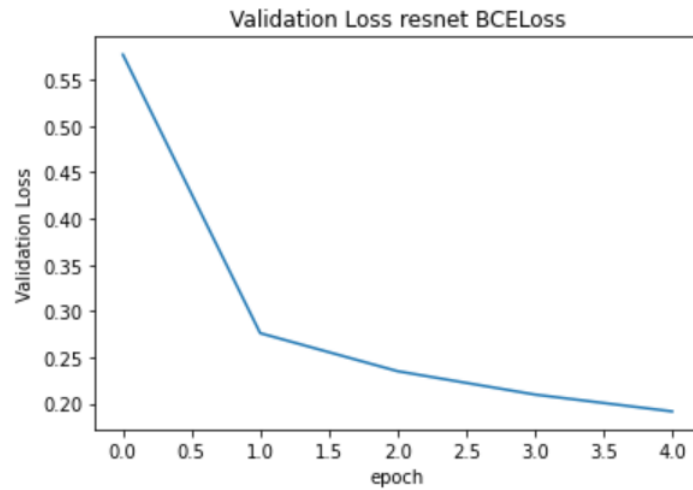
F1 score Validation

Covid	Normal	Pneumonia
0	0.92	0.86

F1 score Train

Covid	Normal	Pneumonia
0	0.92	0.82





Focal Loss Vgg16 (Used this for csv)

Epoch=5

lr=0.001, momentum=0.9

Confusion Matrix Test

	Covid	Normal	Pneumonia
Covid	70	26	104
Normal	3	3629	368
Pneumonia	4	209	1787

Confusion Matrix Validation

	Covid	Normal	Pneumonia
Covid	23	1	4
Normal	8	378	14
Pneumonia	6	14	180

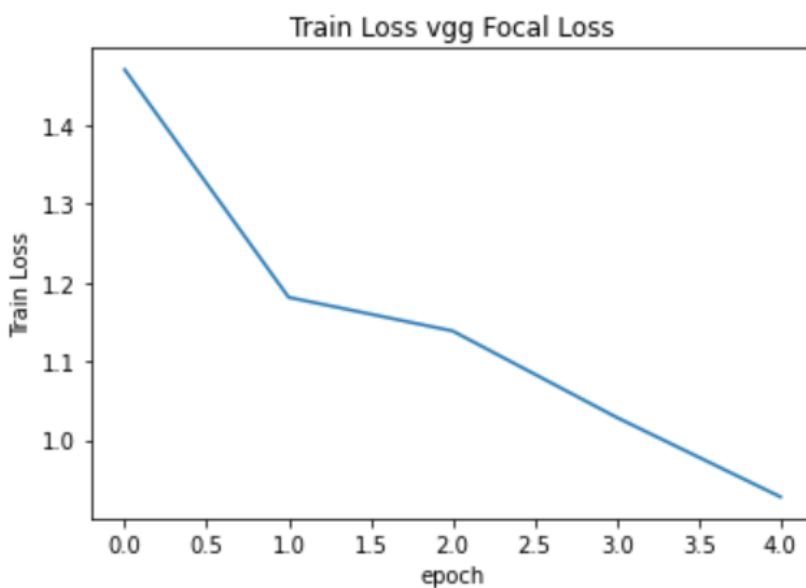
Accuracy on validation= 92%

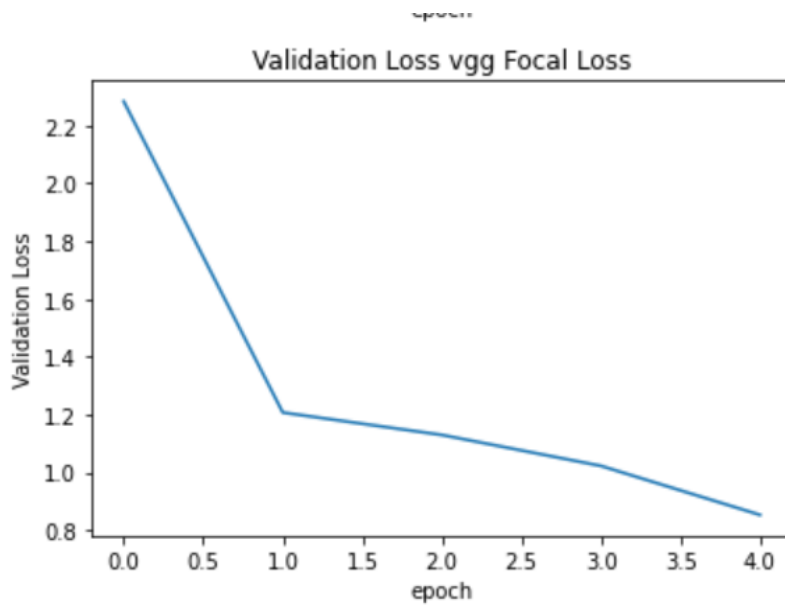
F1 score Validaton

Covid	Normal	Pneumonia
0.70	0.95	0.94

F1 score Train

Covid	Normal	Pneumonia
0.505	0.92	0.83





BCE Loss VGG16 with 2 FC layer

Epoch=5

lr=0.001, momentum=0.9

Confusion Matrix Test

	Covid	Normal	Pneumonia
Covid	63	60	77
Normal	1	3900	99
Pneumonia	14	395	1591

Confusion Matrix Validation

	Covid	Normal	Pneumonia
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Covid	9	16	3
Normal	6	390	4
Pneumonia	15	23	162

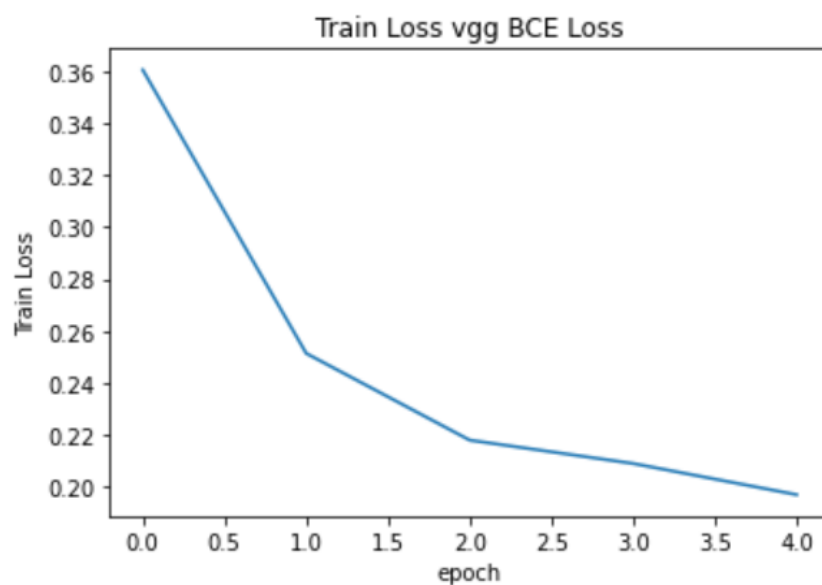
Accuracy on validation= 89 %

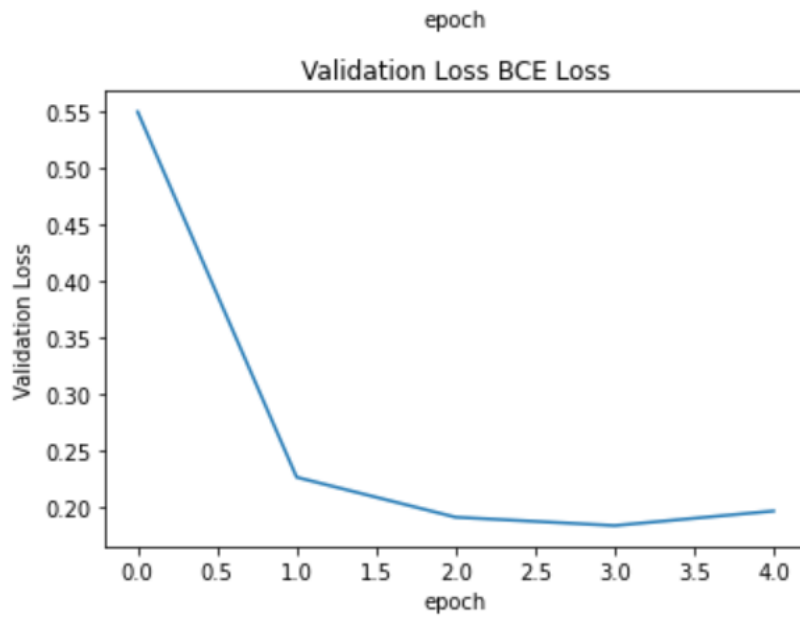
F1 score Validaton

Covid	Normal	Pneumonia
0.31	0.94	0.87

F1 score Train

Covid	Normal	Pneumonia
0.45	0.93	0.844





Focal Loss Resnet with 1 FC layer

Epoch=5

lr=0.001, momentum=0.9

Confusion Matrix Test

	Covid	Normal	Pneumonia
Covid	114	37	49
Normal	8	3839	153
Pneumonia	25	385	1590

Confusion Matrix Validation

	Covid	Normal	Pneumonia
Covid	16	8	4
Normal	3	391	6

Pneumonia	5	29	166
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Accuracy on validation= 83%

F1 score Validaton

Covid	Normal	Pneumonia
0.61	0.94	0.88

F1 score Train

Covid	Normal	Pneumonia
0.65	0.92	0.83

Focal Loss Resnet with 2 FC layer

Epoch=5

lr=0.01, momentum=0.9

Confusion Matrix Test

	Covid	Normal	Pneumonia
Covid	0	64	136
Normal	0	3637	327
Pneumonia	0	423	1577

Confusion Matrix Validation

	Covid	Normal	Pneumonia
Covid	0	9	19
Normal	0	379	21

Pneumonia	0	28	172
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Accuracy on validation= 87%

F1 score Validaton

Covid	Normal	Pneumonia
0	0.92	0.83

F1 score Train

Covid	Normal	Pneumonia
0	0.90	0.78