Results

Experiments

1. Learning Algorithms:
   a. Resnet-34
   b. Resnet-50
   c. Resnet-152
   d. Squeezenet
2. For every algo i've tried 4 variants
   a. With freezing : Freezing all layers except classifier.
   b. Without freezing: Instead of random initialization of weights i've initialized with pretrained weights.
3. Every variant was tried with two loss functions:
   a. Cross Entropy
   b. Focal Loss

Dataset

```
Folders in Data set :  ['non-COVID', 'COVID']
Classes :  ['non-COVID', 'COVID']
abnormal images :  1252
normal images :  1229
```

Data Set	Abnormal	Normal	Total
Train	1013	995	2008
Val	113	111	224
Test	126	123	249
Whole dataset(Train+Val)	1126	1106	2232

Loss Function comparison

	Cross Entropy	Focal Loss
Resnet34+ WF	86.75	85.14
Resnet34+WoF	95.18	83.94
Resnet50+WF	91.57	87.95
Resnet50+WoF	92.77	83.94
Resnet152+WF	93.98	87.95
Resnet152+WoF	TMT	TMT
Squeezenet+WF	87.15	86.35
Squeezenet+WoF	50.60	49.4

- Cross Entropy is the best loss function
- TMT- Taking More Time

```
Resnet34 - with freezing cross entropy + CV
Test Loss : 0.35          Test Accuracy : 86.75
```

```
Resnet34 - without freezing + Cross Entropy + CV
Test Loss : 0.15          Test Accuracy : 95.18
```

```
Resnet34 - without freezing + focal loss + CV
Test Loss : 0.03          Test Accuracy : 83.94
```

```
Resnet50 - with freezing cross entropy + CV
Test Loss : 0.22          Test Accuracy : 91.57
```

```
Resnet50 - with freezing focal loss + CV
Test Loss : 0.28          Test Accuracy : 87.95
```

```
Resnet50 - without freezing + Cross Entropy + CV
Test Loss : 0.19          Test Accuracy : 92.77
```

```
Resnet50 - without freezing + focal loss + CV
Test Loss : 0.03          Test Accuracy : 83.94
```

```
Resnet152 - with freezing cross entropy + CV
Test Loss : 0.17          Test Accuracy : 93.98
```

```
Resnet152 - with freezing focal loss + CV
Test Loss : 0.28          Test Accuracy : 87.95
```

```
SQUEEZENET - with freezing + Cross Entropy + CV
Test Loss : 0.31          Test Accuracy : 87.15
```

```
SQUEEZENET - with freezing + focal loss + CV
Test Loss : 0.04          Test Accuracy : 86.35
```

```
SQUEEZENET - without freezing + Cross Entropy + CV
Test Loss : 0.69          Test Accuracy : 50.60
```

```
SQUEEZENET - without freezing + focal loss + CV
Test Loss : 0.07          Test Accuracy : 49.40
```

WF vs WoF

	WF	WoF
Resnet34+ CE	86.75	95.18
Resnet34+FL	85.14	83.94
Resnet50+CE	91.57	92.77
Resnet50+FL	87.95	83.94
Resnet152+CE	93.98	TMT
Resnet152+FL	87.95	TMT
Squeezenet+CE	87.15	50.60
Squeezenet+FL	86.35	49.40

- In resnets - Resnet+WoF is the best.
- In squeezenet - Squeezenet+WF is the best.

Model Comparison

	CE+WF	CE+WoF	FL+WF	FL+WoF
Resnet34	86.75	95.18	85.14	83.94
Resnet50	91.57	92.77	87.95	83.94
Resnet152	93.98	TMT	87.95	TMT
Squeezenet	87.15	50.60	86.35	49.40

- Resnet34 is the best model.
- Resnet50 also performs better.
- Number of layers in resnet increases then it's performance is hurting.
- So Resnet34 is the chosen model.

Conclusion

- **Top Model** : Resnet34
- Better combinations:
  - Resnet34+CE+WoF
  - Resnet50+CE+WoF
  - Resnet152+CE+WF
- **Best loss function** : Cross Entropy
- **Best variant** : Without freezing

Note: for confusion matrix and train and val loss graphs please look at the below link:

Graphs