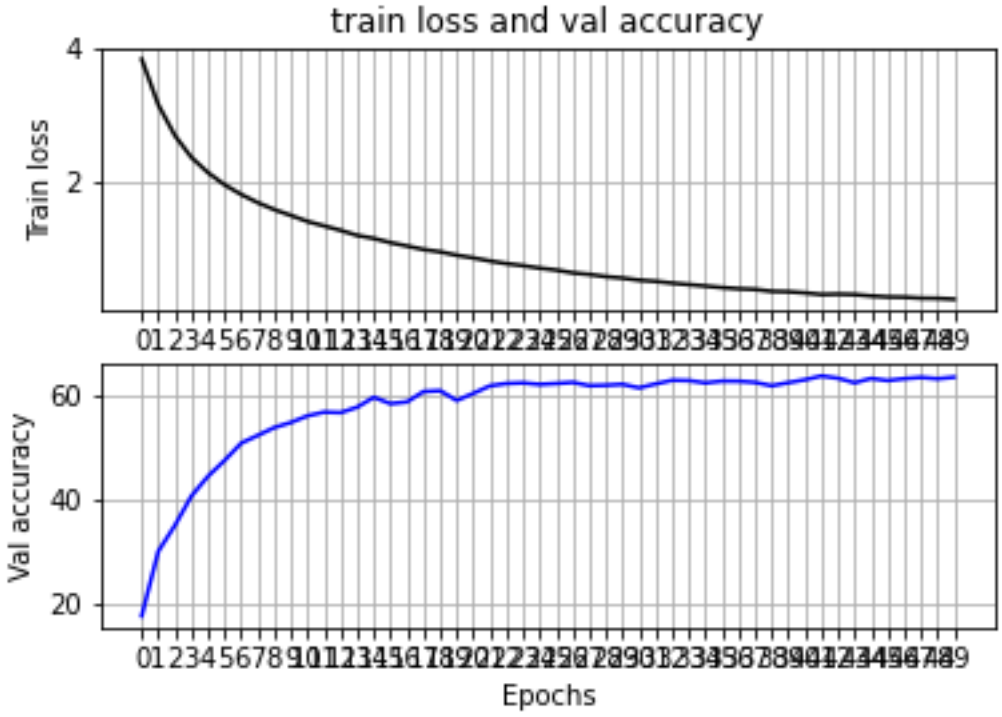
Part 1

1. Kaggle name: TonyHuang42
2. Best accuracy: 62.9%

layer No.	Layer Type	Kernel Size (for conv layers)	Input | Output Dimension	Input | Output Channels (for conv layers)
1	conv2d	3	32 | 32	3 | 64
2	BatchNorm2d	-	32 | 32	-
3	ReLU	-	32 | 32	-
4	conv2d	3	32 | 32	64 | 64
5	BatchNorm2d	-	32 | 32	-
6	ReLU	-	32 | 32	-
7	MaxPool2d	-	32 | 16	-
8	conv2d	3	16 | 16	64 | 128
9	BatchNorm2d	-	16 | 16	-
10	ReLU	-	16 | 16	-
11	conv2d	3	16 | 16	128 | 128
12	BatchNorm2d	-	16 | 16	-
13	ReLU	-	16 | 16	-
14	MaxPool2d	-	16 | 8	-
15	conv2d	3	8 | 8	128 | 256
16	BatchNorm2d	-	8 | 8	-
17	ReLU	-	8 | 8	-
18	conv2d	3	8 | 8	256 | 256
19	BatchNorm2d	-	8 | 8	-
20	ReLU	-	8 | 8	-
21	conv2d	3	8 | 8	256 | 256
22	BatchNorm2d	-	8 | 8	-
23	ReLU	-	8 | 8	-
24	MaxPool2d	-	8 | 4	-
25	conv2d	3	4 | 4	256 | 512
26	BatchNorm2d	-	4 | 4	-
27	ReLU	-	4 | 4	-
28	conv2d	3	4 | 4	512 | 512
29	BatchNorm2d	-	4 | 4	-
30	ReLU	-	4 | 4	-
31	conv2d	3	4 | 4	512 | 512
32	BatchNorm2d	-	4 | 4	-
33	ReLU	-	4 | 4	-
34	MaxPool2d	-	4 | 2	-
35	Linear	-	2048 | 256	-
36	BatchNorm1d	-	256 | 256	-
37	ReLU	-	256 | 256	-
38	Linear	-	256 | 256	-

39	BatchNorm1d	-	256 | 256	-
40	ReLU	-	256 | 256	-
41	Linear	-	256 | 100	-



ablation study: for the BaseNet, it only has 23% accuracy, after I create a much deeper network with 41 layers, the accuracy increases to 63%.

Part 2:

1. fixed feature extractor train accuracy: 62.7%

```
TRAINING Epoch 1/20 Loss 0.1676 Accuracy 0.0120
TRAINING Epoch 2/20 Loss 0.1556 Accuracy 0.0457
TRAINING Epoch 3/20 Loss 0.1463 Accuracy 0.1057
TRAINING Epoch 4/20 Loss 0.1372 Accuracy 0.1757
TRAINING Epoch 5/20 Loss 0.1296 Accuracy 0.2383
TRAINING Epoch 6/20 Loss 0.1222 Accuracy 0.3050
TRAINING Epoch 7/20 Loss 0.1156 Accuracy 0.3590
TRAINING Epoch 8/20 Loss 0.1096 Accuracy 0.4077
TRAINING Epoch 9/20 Loss 0.1044 Accuracy 0.4400
TRAINING Epoch 10/20 Loss 0.1008 Accuracy 0.4517
TRAINING Epoch 11/20 Loss 0.0958 Accuracy 0.4930
TRAINING Epoch 12/20 Loss 0.0922 Accuracy 0.5150
TRAINING Epoch 13/20 Loss 0.0879 Accuracy 0.5447
TRAINING Epoch 14/20 Loss 0.0854 Accuracy 0.5550
TRAINING Epoch 15/20 Loss 0.0824 Accuracy 0.5577
TRAINING Epoch 16/20 Loss 0.0783 Accuracy 0.5930
TRAINING Epoch 17/20 Loss 0.0761 Accuracy 0.5987
TRAINING Epoch 18/20 Loss 0.0742 Accuracy 0.6137
TRAINING Epoch 19/20 Loss 0.0722 Accuracy 0.6173
TRAINING Epoch 20/20 Loss 0.0707 Accuracy 0.6270
Finished Training
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```

fixed feature extractor test accuracy: 40.92%

```
Test Loss: 0.0800 Test Accuracy 0.4092
```

fine-tuning the whole network train accuracy: 86.1%

```
TRAINING Epoch 1/20 Loss 0.1656 Accuracy 0.0160
TRAINING Epoch 2/20 Loss 0.1424 Accuracy 0.1130
TRAINING Epoch 3/20 Loss 0.1197 Accuracy 0.2587
TRAINING Epoch 4/20 Loss 0.1020 Accuracy 0.3850
TRAINING Epoch 5/20 Loss 0.0876 Accuracy 0.4847
TRAINING Epoch 6/20 Loss 0.0769 Accuracy 0.5460
TRAINING Epoch 7/20 Loss 0.0690 Accuracy 0.5953
TRAINING Epoch 8/20 Loss 0.0613 Accuracy 0.6463
TRAINING Epoch 9/20 Loss 0.0552 Accuracy 0.6927
TRAINING Epoch 10/20 Loss 0.0497 Accuracy 0.7263
TRAINING Epoch 11/20 Loss 0.0453 Accuracy 0.7570
TRAINING Epoch 12/20 Loss 0.0401 Accuracy 0.7833
TRAINING Epoch 13/20 Loss 0.0388 Accuracy 0.7893
TRAINING Epoch 14/20 Loss 0.0359 Accuracy 0.8130
TRAINING Epoch 15/20 Loss 0.0329 Accuracy 0.8253
TRAINING Epoch 16/20 Loss 0.0313 Accuracy 0.8357
TRAINING Epoch 17/20 Loss 0.0288 Accuracy 0.8447
TRAINING Epoch 18/20 Loss 0.0285 Accuracy 0.8410
TRAINING Epoch 19/20 Loss 0.0256 Accuracy 0.8670
TRAINING Epoch 20/20 Loss 0.0253 Accuracy 0.8610
Finished Training
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```

fine-tuning the whole network test accuracy: 55.82%

```
Test Loss: 0.0523 Test Accuracy 0.5582
```

2. batch_size: 32
   learning_rate: 0.002
   resnet_last_only: False
   num_epochs: 20