Mayank Raj (B19CSE053)

Q1)

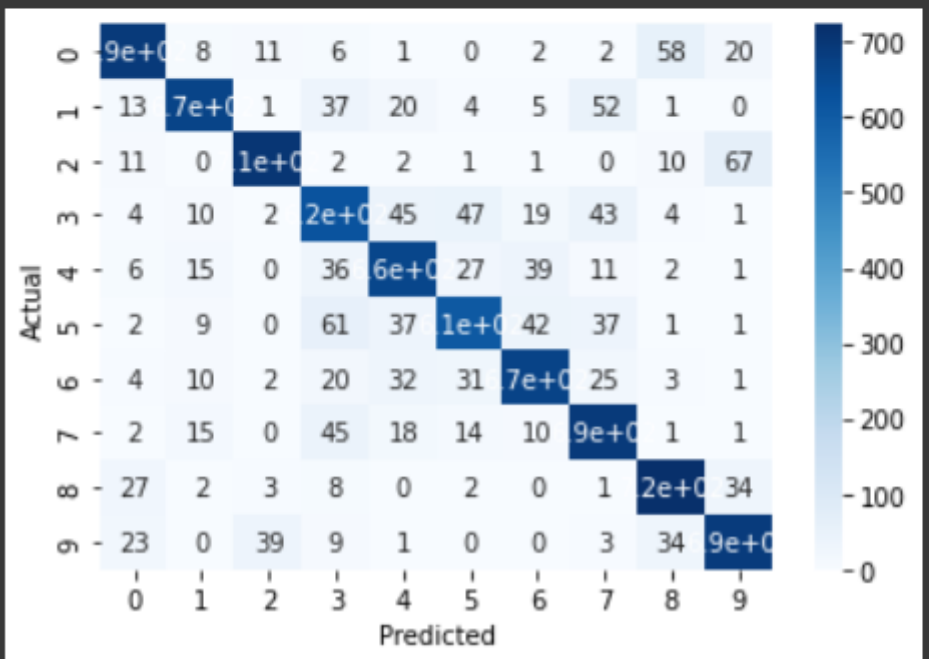
Part A

Extracted features from a pretrained resnet50 and fed it into a SVM classifier.

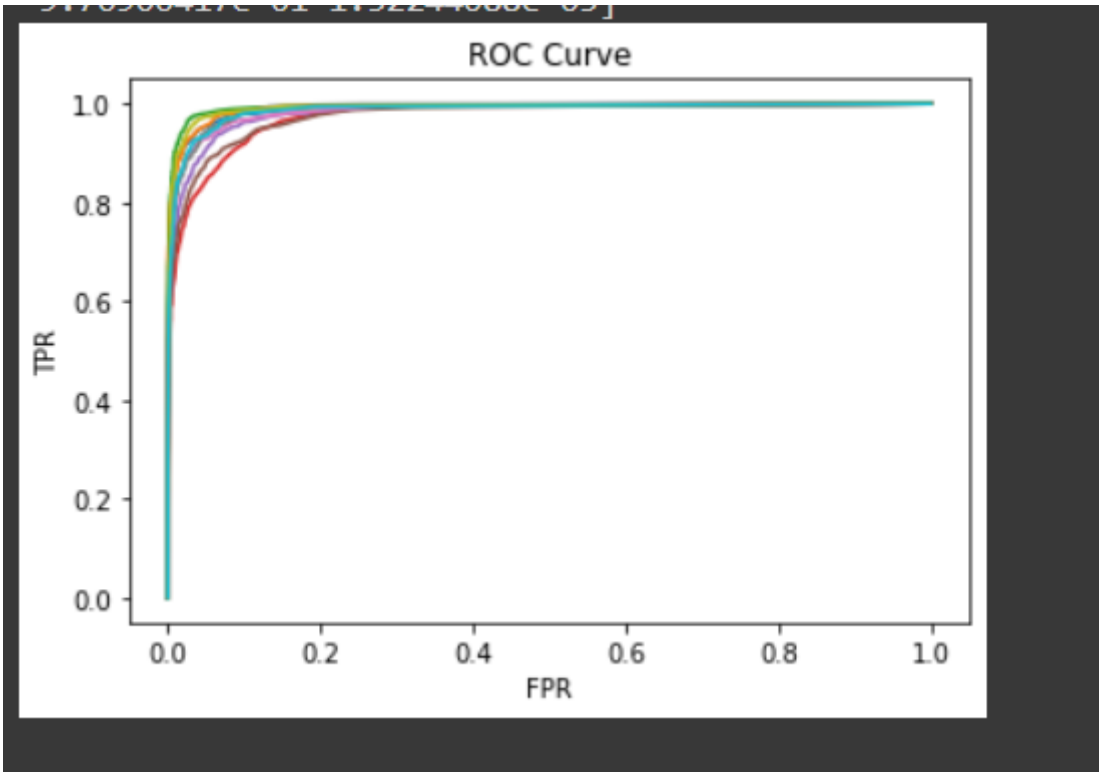
Parameter	Train	Test
Accuracy	98.28%	84.28%

Confusion Matrix

Predicted	0	1	2	3	4	5	6	7	8	9
Actual										
0	692	8	11	6	1	0	2	2	58	20
1	13	667	1	37	20	4	5	52	1	0
2	11	0	706	2	2	1	1	0	10	67
3	4	10	2	625	45	47	19	43	4	1
4	6	15	0	36	663	27	39	11	2	1
5	2	9	0	61	37	610	42	37	1	1
6	4	10	2	20	32	31	672	25	3	1
7	2	15	0	45	18	14	10	694	1	1
8	27	2	3	8	0	2	0	1	723	34
9	23	0	39	9	1	0	0	3	34	691



ROC Curve

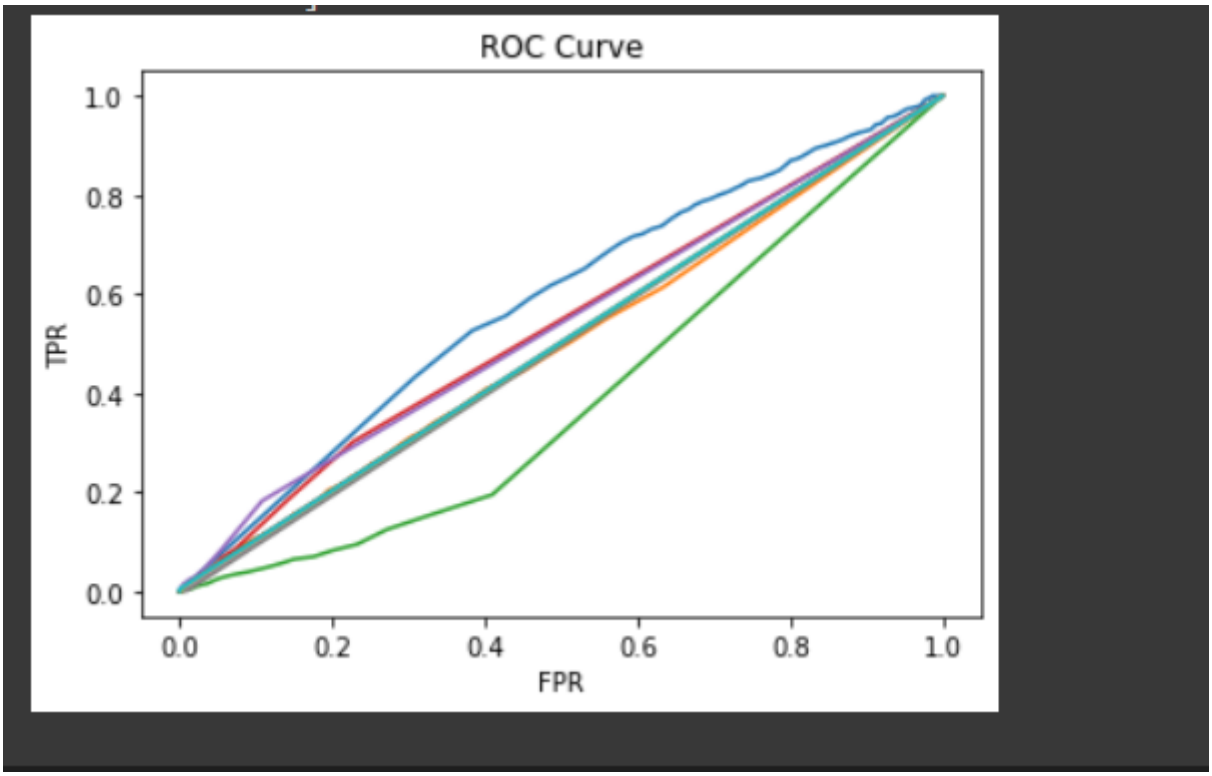


Part B

Fine tuned Resnet50 by making layer3 and layer2 trainable and using Adam optimiser.

Test Accuracy 72.23%

ROC Curve

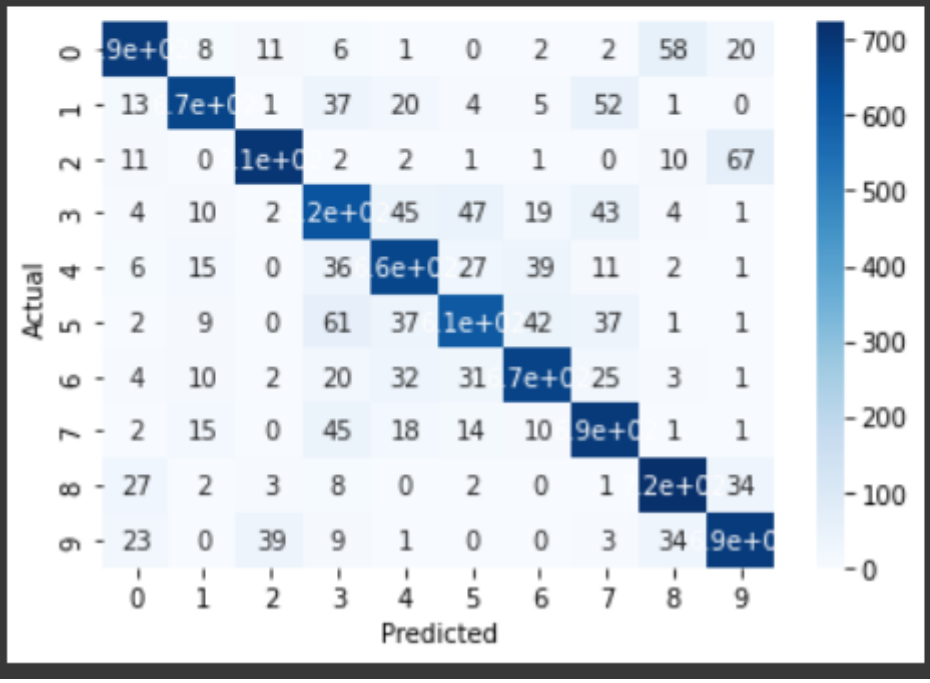


Class wise Accuracy

```
Class 0: 81.875%
Class 1: 73.875%
Class 2: 88.625%
Class 3: 73.0%
Class 4: 56.75%
Class 5: 51.37500000000001%
Class 6: 72.25%
Class 7: 67.625%
Class 8: 81.375%
Class 9: 75.625%
```

Confusion Matrix

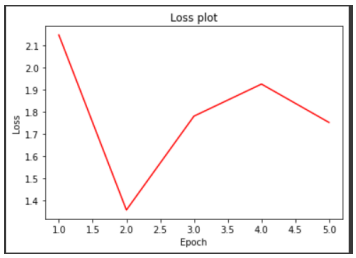
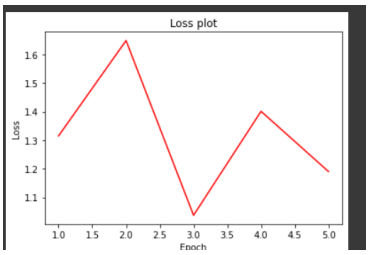
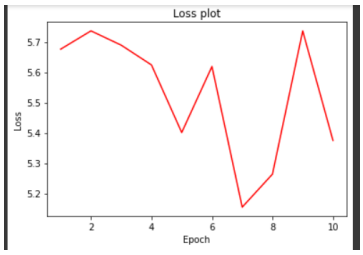
Predicted	0	1	2	3	4	5	6	7	8	9
Actual										
0	692	8	11	6	1	0	2	2	58	20
1	13	667	1	37	20	4	5	52	1	0
2	11	0	706	2	2	1	1	0	10	67
3	4	10	2	625	45	47	19	43	4	1
4	6	15	0	36	663	27	39	11	2	1
5	2	9	0	61	37	610	42	37	1	1
6	4	10	2	20	32	31	672	25	3	1
7	2	15	0	45	18	14	10	694	1	1
8	27	2	3	8	0	2	0	1	723	34
9	23	0	39	9	1	0	0	3	34	691



Q2

- Finetuned Resnet18 and did classification on all 200 classes.
- Implemeted Dataloader for Triplet Loss and Center loss from scratch.
- Implemnet Center loss from scratch.

NOTE: No. of epochs taken are small as I have no access to GPU servers and google collab limits GPU access and so each epoch takes upto 20 minutes of time. Due to this my loss curves are discrete rather than continuous because of less epochs.

Parameter	Cross-entropy Loss	Triplet Loss	Center Loss
Train Accuracy	58.025%	68.72%	65.72%
Test Accuracy	51.59%	51.2%	48.97%
Loss plots			

Q3

- Implemented a 3-layer CNN network for dogs vs cats classification task.
- Compared the accuracy on various optimisation Techniques

Parameter	Vanilla SGD	Mini Batch SGD	Mini Batch with momentum	Mini Batch with Adam
Accuracy	83.21	81.42%	78.84%	73.2%
Loss plots