

ADL ASS-2

Q1: (a)

Learning rate= 0.001, epochs = 20, masked ratio = 0.5, hidden dimension = 128

```
Epoch 1/20, Loss: 0.11203228011727333
Epoch 2/20, Loss: 0.07509978264570236
Epoch 3/20, Loss: 0.0636062439531088
Epoch 4/20, Loss: 0.05790376998484135
Epoch 5/20, Loss: 0.05218394286930561
Epoch 6/20, Loss: 0.049809323623776436
Epoch 7/20, Loss: 0.046539321541786194
Epoch 8/20, Loss: 0.04476714283227921
Epoch 9/20, Loss: 0.04289985001087189
Epoch 10/20, Loss: 0.04073653407394886
Epoch 11/20, Loss: 0.03887278027832508
Epoch 12/20, Loss: 0.03797945268452167
Epoch 13/20, Loss: 0.036875106394290924
Epoch 14/20, Loss: 0.03642340637743473
Epoch 15/20, Loss: 0.03491780515760183
Epoch 16/20, Loss: 0.03494895026087761
Epoch 17/20, Loss: 0.033698853477835654
Epoch 18/20, Loss: 0.03335451576858759
Epoch 19/20, Loss: 0.033155296742916104
Epoch 20/20, Loss: 0.032266014628112315
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Epoch 1/20, Train Loss: 0.581464010104537
Epoch 2/20, Train Loss: 0.10969041760254186
Epoch 3/20, Train Loss: 0.0664628135971725
Epoch 4/20, Train Loss: 0.036384543223539366
Epoch 5/20, Train Loss: 0.02741129508067388
Epoch 6/20, Train Loss: 0.002994774535181932
Epoch 7/20, Train Loss: 0.0015195136045804247
Epoch 8/20, Train Loss: 0.0009332541827461682
Epoch 9/20, Train Loss: 0.00034522770074545405
Epoch 10/20, Train Loss: 0.00022042851742298808
Epoch 11/20, Train Loss: 0.00016689043550286443
Epoch 12/20, Train Loss: 0.00012074079240846914
Epoch 13/20, Train Loss: 0.00011581165454117581
Epoch 14/20, Train Loss: 0.00010470657107362059
Epoch 15/20, Train Loss: 9.108317462960258e-05
Epoch 16/20, Train Loss: 8.694369535078295e-05
Epoch 17/20, Train Loss: 7.636641530552878e-05
Epoch 18/20, Train Loss: 6.0455060338426844e-05
Epoch 19/20, Train Loss: 5.7279931024822875e-05
Epoch 20/20, Train Loss: 5.085634074930567e-05
Test Accuracy: 99.00%
Confusion Matrix:
[[ 98   1   1]
 [  0  99   1]
 [  0   0 100]]
```

(b) InfoNCE loss

```
Epoch 1/20, InfoNCE Loss: 1.9199421048164367
Epoch 2/20, InfoNCE Loss: 1.7209267497062684
Epoch 3/20, InfoNCE Loss: 1.730515956878662
Epoch 4/20, InfoNCE Loss: 1.6945681989192962
Epoch 5/20, InfoNCE Loss: 1.6959006905555725
Epoch 6/20, InfoNCE Loss: 1.6701370358467102
Epoch 7/20, InfoNCE Loss: 1.681786549091339
Epoch 8/20, InfoNCE Loss: 1.6889819145202636
Epoch 9/20, InfoNCE Loss: 1.667844969034195
Epoch 10/20, InfoNCE Loss: 1.6676451444625855
Epoch 11/20, InfoNCE Loss: 1.6722133874893188
Epoch 12/20, InfoNCE Loss: 1.6660508692264557
Epoch 13/20, InfoNCE Loss: 1.651198810338974
Epoch 14/20, InfoNCE Loss: 1.6452970683574677
Epoch 15/20, InfoNCE Loss: 1.6451333820819856
Epoch 16/20, InfoNCE Loss: 1.6451538383960724
Epoch 17/20, InfoNCE Loss: 1.6395794451236725
Epoch 18/20, InfoNCE Loss: 1.6405220806598664
Epoch 19/20, InfoNCE Loss: 1.6577413916587829
Epoch 20/20, InfoNCE Loss: 1.6455008745193482
```

```
Epoch 1/20, Train Loss: 0.43886166512966157
Epoch 2/20, Train Loss: 0.04200352968182415
Epoch 3/20, Train Loss: 0.015348841657396407
Epoch 4/20, Train Loss: 0.004272620846313658
Epoch 5/20, Train Loss: 0.00029417398072837384
Epoch 6/20, Train Loss: 0.00016491358510393184
Epoch 7/20, Train Loss: 8.715736821613973e-05
Epoch 8/20, Train Loss: 7.578603235742775e-05
Epoch 9/20, Train Loss: 5.7632538118923546e-05
Epoch 10/20, Train Loss: 6.594566766580102e-05
Epoch 11/20, Train Loss: 5.3306879271985964e-05
Epoch 12/20, Train Loss: 5.0588568046805446e-05
Epoch 13/20, Train Loss: 4.4439445082389285e-05
Epoch 14/20, Train Loss: 4.065501370860147e-05
Epoch 15/20, Train Loss: 4.0358952173846777e-05
Epoch 16/20, Train Loss: 3.705776634888025e-05
Epoch 17/20, Train Loss: 3.505846252664924e-05
Epoch 18/20, Train Loss: 3.463407683739206e-05
Epoch 19/20, Train Loss: 2.7696394818121915e-05
Epoch 20/20, Train Loss: 3.356802371854428e-05
Test Accuracy: 99.00%
Confusion Matrix:
[[99  0  1]
 [ 0 99  1]
 [ 0  1 99]]
```

(C): MAE and InfoNCE and give a weight of 0.8 to MAE loss and 0.2 to InfoNCE loss.

```
Epoch 1/20, Combined Loss (MAE + InfoNCE): 0.44800223410129547
Epoch 2/20, Combined Loss (MAE + InfoNCE): 0.38868720531463624
Epoch 3/20, Combined Loss (MAE + InfoNCE): 0.3696760326623917
Epoch 4/20, Combined Loss (MAE + InfoNCE): 0.3638882577419281
Epoch 5/20, Combined Loss (MAE + InfoNCE): 0.35507997423410415
Epoch 6/20, Combined Loss (MAE + InfoNCE): 0.3482196643948555
Epoch 7/20, Combined Loss (MAE + InfoNCE): 0.34474830478429797
Epoch 8/20, Combined Loss (MAE + InfoNCE): 0.3458032086491585
Epoch 9/20, Combined Loss (MAE + InfoNCE): 0.3455981820821762
Epoch 10/20, Combined Loss (MAE + InfoNCE): 0.3439487859606743
Epoch 11/20, Combined Loss (MAE + InfoNCE): 0.34252172112464907
Epoch 12/20, Combined Loss (MAE + InfoNCE): 0.34050036370754244
Epoch 13/20, Combined Loss (MAE + InfoNCE): 0.3399395927786827
Epoch 14/20, Combined Loss (MAE + InfoNCE): 0.33940733373165133
Epoch 15/20, Combined Loss (MAE + InfoNCE): 0.33965698182582854
Epoch 16/20, Combined Loss (MAE + InfoNCE): 0.3383944734930992
Epoch 17/20, Combined Loss (MAE + InfoNCE): 0.33610949516296384
Epoch 18/20, Combined Loss (MAE + InfoNCE): 0.33455678522586824
Epoch 19/20, Combined Loss (MAE + InfoNCE): 0.3344637602567673
Epoch 20/20, Combined Loss (MAE + InfoNCE): 0.3340968877077103
```

```
Epoch 1/20, Train Loss: 0.41131226494908335
Epoch 2/20, Train Loss: 0.037910232227295636
Epoch 3/20, Train Loss: 0.0011891151283634827
Epoch 4/20, Train Loss: 0.0005126359610585496
Epoch 5/20, Train Loss: 9.72888547948969e-05
Epoch 6/20, Train Loss: 5.886275248485617e-05
Epoch 7/20, Train Loss: 9.037218543426207e-05
Epoch 8/20, Train Loss: 3.422024456085637e-05
Epoch 9/20, Train Loss: 3.708544677465398e-05
Epoch 10/20, Train Loss: 2.8812881964768167e-05
Epoch 11/20, Train Loss: 2.2385712509276345e-05
Epoch 12/20, Train Loss: 1.9833281157843885e-05
Epoch 13/20, Train Loss: 2.0982691421522758e-05
Epoch 14/20, Train Loss: 1.9032865748158655e-05
Epoch 15/20, Train Loss: 2.2153226200316568e-05
Epoch 16/20, Train Loss: 1.9322574735269883e-05
Epoch 17/20, Train Loss: 1.8399746386421613e-05
Epoch 18/20, Train Loss: 1.4911678817952634e-05
Epoch 19/20, Train Loss: 1.7022707652358804e-05
Epoch 20/20, Train Loss: 1.3024317786403116e-05
```

Test Accuracy: 98.00%

Confusion Matrix:

```
[[ 98   0   2]
 [  0 100   0]
 [  2   2 96]]
```

Q4: Video MAE

```
Epoch 1/20, Pretraining Loss: 0.18979522978004656
Epoch 2/20, Pretraining Loss: 0.13230857723637632
Epoch 3/20, Pretraining Loss: 0.10349317914561222
Epoch 4/20, Pretraining Loss: 0.0842678668467622
Epoch 5/20, Pretraining Loss: 0.06977845002946101
Epoch 6/20, Pretraining Loss: 0.058081918249004764
Epoch 7/20, Pretraining Loss: 0.048894419089743964
Epoch 8/20, Pretraining Loss: 0.041238336774863694
Epoch 9/20, Pretraining Loss: 0.035019256566700185
Epoch 10/20, Pretraining Loss: 0.02993740249229105
Epoch 11/20, Pretraining Loss: 0.02602270980806727
Epoch 12/20, Pretraining Loss: 0.02256613754128155
Epoch 13/20, Pretraining Loss: 0.019423122762849455
Epoch 14/20, Pretraining Loss: 0.01706473298959042
Epoch 15/20, Pretraining Loss: 0.015256943132140134
Epoch 16/20, Pretraining Loss: 0.013761960852303003
Epoch 17/20, Pretraining Loss: 0.012073563607899766
Epoch 18/20, Pretraining Loss: 0.010817916867764373
Epoch 19/20, Pretraining Loss: 0.009934318938145512
Epoch 20/20, Pretraining Loss: 0.008985820741049554
```

```
Epoch 1/20, Train Loss: 0.968763182037755
Epoch 2/20, Train Loss: 0.2521468949210095
Epoch 3/20, Train Loss: 0.09516472957636181
Epoch 4/20, Train Loss: 0.08644543193574798
Epoch 5/20, Train Loss: 0.031327946129941234
Epoch 6/20, Train Loss: 0.016380778011424763
Epoch 7/20, Train Loss: 0.004733690558503823
Epoch 8/20, Train Loss: 0.0011248452206736577
Epoch 9/20, Train Loss: 0.00020348857613402958
Epoch 10/20, Train Loss: 0.00012959717595980406
Epoch 11/20, Train Loss: 0.00011562878200110342
Epoch 12/20, Train Loss: 9.350226814843297e-05
Epoch 13/20, Train Loss: 9.511260922360969e-05
Epoch 14/20, Train Loss: 8.502862702267808e-05
Epoch 15/20, Train Loss: 7.62588962587822e-05
Epoch 16/20, Train Loss: 7.258323746914117e-05
Epoch 17/20, Train Loss: 7.018676296866033e-05
Epoch 18/20, Train Loss: 5.2847641870214014e-05
Epoch 19/20, Train Loss: 5.9655439575803224e-05
Epoch 20/20, Train Loss: 5.337197130996317e-05
```

Test Accuracy: 98.67%

Confusion Matrix:

```
[[100  0  0]
 [  0 99  1]
 [  2  1 97]]
```