

CS 574 – Intelligent Visual Computing

Assignment 3 - Point descriptors and alignment

Sai Vineeth Kumar Dara
33526237

Task A:

Implemented the PointNet architecture in the model.py file.

Task B:

Implemented the CorrNet architecture in the model.py file.

Task C:

Implemented the NTCrossentropy loss function in the train.py file.

Task D:

For train_corrmask = 0 and distance_threshold = 0.01:

Best model according to validation accuracy occurred at Epoch: 94, LR: 0.00100000, losses are as follows:

train_loss: 1025.54915946. train_acc: 0.59913747.

val_loss: 1133.87621307. val_acc: 0.56384957.

test_loss: 1140.05135345. test_acc: 0.52675712.

For train_corrmask = 0 and distance_threshold = 0.02:

Best model according to validation accuracy occurred at Epoch: 97, LR: 0.00100000, losses are as follows:

train_loss: 930.43209185. train_acc: 0.94144024.

val_loss: 1084.11852264. val_acc: 0.92445910.

test_loss: 1179.56261444. test_acc: 0.89423919.

For train_corrmask = 0 and distance_threshold = 0.04:

Best model according to validation accuracy occurred at Epoch: 51, LR: 0.00100000, losses are as follows:

train_loss: 1105.07366616. train_acc: 0.99809322.

val_loss: 1222.20777130. val_acc: 0.99764651.

test_loss: 1316.02962494. test_acc: 0.99124306.

For train_corrmask = 1 and distance_threshold = 0.01:

Best model according to validation accuracy occurred at Epoch: 87, LR: 0.00100000, losses are as follows:

Validation set: Average fitted rotation: [2.16989206 -2.08670042 -0.66719806]

Test set: Average fitted rotation: [2.2429322 1.2680177 -0.95615139]

train_loss: 0.48254553. train_acc: 0.76293430.

val_loss: 0.51418624. val_acc: 0.75582284.

test_loss: 0.50977021. test_acc: 0.76100135.

For train_corrmask = 1 and distance_threshold = 0.02:

Best model according to validation accuracy occurred at Epoch: 100, LR: 0.00100000, losses are as follows:

Validation set: Average fitted rotation: [1.48767515 -6.98372588 -0.76175351]

Test set: Average fitted rotation: [-0.29842349 -1.70647408 0.6873297]

train_loss: 0.52223992. train_acc: 0.74458625.

val_loss: 0.53602837. val_acc: 0.74381924.

test_loss: 0.53404215. test_acc: 0.74739879.

For train_corrmask = 1 and distance_threshold = 0.04:

Best model according to validation accuracy occurred at Epoch: 89, LR: 0.00100000, losses are as follows:

Validation set: Average fitted rotation: [3.33971124 -4.5137773 4.3871357]

Test set: Average fitted rotation: [1.21715224 0.99535642 2.26499862]

train_loss: 0.53974576. train_acc: 0.72567227.

val_loss: 0.56495960. val_acc: 0.72649384.

test_loss: 0.55748304. test_acc: 0.70353669.

Task E:

Implemented the fit_rotation function in the train.py file.

For distance_threshold = 0.01:

Best model according to validation accuracy occurred at Epoch: 87, LR: 0.00100000

3D rotation angles for the test set: [2.2429322 1.2680177 -0.95615139]

For distance_threshold = 0.02:

Best model according to validation accuracy occurred at Epoch: 100, LR: 0.00100000

3D rotation angles for the test set: [-0.29842349 -1.70647408 0.6873297]

For distance_threshold = 0.04:

Best model according to validation accuracy occurred at Epoch: 89, LR: 0.00100000

3D rotation angles for the test set: [1.21715224 0.99535642 2.26499862]