EMNIST_results

May 28, 2023

[ ]:
```
import methods as M
```

[ ]:
```
M.test_PCA(0, 40, 7, [1, 3, 5])
```

```
======= PCA method: Training and evaluating… =======
Learning background…
Learning 1-shot and predicting…
Accuracy for 1-shot: 0.487107723456202
Learning 3-shot and predicting…
Accuracy for 3-shot: 0.5156445556946183
Learning 5-shot and predicting…
Accuracy for 5-shot: 0.5877721443483448
======= PCA method: Finished =======
```

[ ]:
```
[0.487107723456202, 0.5156445556946183, 0.5877721443483448]
```

[ ]:
```
M.test_LDA(0, 40, 7, [1, 3, 5])
```

```
======= LDA method: Training and evaluating… =======
Learning background…
Learning 1-shot and predicting…
Accuracy for 1-shot: 0.4411361876972548
Learning 3-shot and predicting…
Accuracy for 3-shot: 0.4845342392276059
Learning 5-shot and predicting…
Accuracy for 5-shot: 0.5585445869370713
======= LDA method: Finished =======
```

[ ]:
```
[0.4411361876972548, 0.4845342392276059, 0.5585445869370713]
```

[ ]:
```
M.test_NLAE(0, 40, 7, [1, 3, 5])
```

```
======= Nonlinear autoencoder method: Training and evaluating… =======
Learning background…
Epoch 1/15
3000/3000 [==============================] - 7s 2ms/step - loss: 0.0316
Epoch 2/15
3000/3000 [==============================] - 7s 2ms/step - loss: 0.0248
Epoch 3/15
3000/3000 [==============================] - 7s 2ms/step - loss: 0.0233
```

```
Epoch 4/15
3000/3000 [==============================] - 6s 2ms/step - loss: 0.0224
Epoch 5/15
3000/3000 [==============================] - 6s 2ms/step - loss: 0.0214
Epoch 6/15
3000/3000 [==============================] - 6s 2ms/step - loss: 0.0206
Epoch 7/15
3000/3000 [==============================] - 6s 2ms/step - loss: 0.0203
Epoch 8/15
3000/3000 [==============================] - 6s 2ms/step - loss: 0.0200
Epoch 9/15
3000/3000 [==============================] - 6s 2ms/step - loss: 0.0198
Epoch 10/15
3000/3000 [==============================] - 6s 2ms/step - loss: 0.0196
Epoch 11/15
3000/3000 [==============================] - 6s 2ms/step - loss: 0.0195
Epoch 12/15
3000/3000 [==============================] - 6s 2ms/step - loss: 0.0194
Epoch 13/15
3000/3000 [==============================] - 6s 2ms/step - loss: 0.0193
Epoch 14/15
3000/3000 [==============================] - 6s 2ms/step - loss: 0.0192
Epoch 15/15
3000/3000 [==============================] - 6s 2ms/step - loss: 0.0191
Learning 1-shot and predicting…
Accuracy for 1-shot: 0.5023521705472518
Learning 3-shot and predicting…
Accuracy for 3-shot: 0.5177900947613088
Learning 5-shot and predicting…
Accuracy for 5-shot: 0.5811512078735461
======= Nonlinear autoencoder method: Finished =======
```

[ ]:
```
[0.5023521705472518, 0.5177900947613088, 0.5811512078735461]
```

[ ]:
```
M.test_NLAE_CNNE(0, 40, 7, [1, 3, 5])
```

```
======= Nonlinear autoencoder with CNN encoder method: Training and
evaluating… =======
Learning background…
Epoch 1/15
3000/3000 [==============================] - 36s 12ms/step - loss: 0.0335
Epoch 2/15
3000/3000 [==============================] - 34s 11ms/step - loss: 0.0193
Epoch 3/15
3000/3000 [==============================] - 34s 11ms/step - loss: 0.0178
Epoch 4/15
3000/3000 [==============================] - 35s 12ms/step - loss: 0.0171
Epoch 5/15
```

```
3000/3000 [==============================] - 35s 12ms/step - loss: 0.0167
Epoch 6/15
3000/3000 [==============================] - 35s 12ms/step - loss: 0.0164
Epoch 7/15
3000/3000 [==============================] - 36s 12ms/step - loss: 0.0162
Epoch 8/15
3000/3000 [==============================] - 35s 12ms/step - loss: 0.0160
Epoch 9/15
3000/3000 [==============================] - 36s 12ms/step - loss: 0.0159
Epoch 10/15
3000/3000 [==============================] - 35s 12ms/step - loss: 0.0158
Epoch 11/15
3000/3000 [==============================] - 35s 12ms/step - loss: 0.0157
Epoch 12/15
3000/3000 [==============================] - 36s 12ms/step - loss: 0.0156
Epoch 13/15
3000/3000 [==============================] - 35s 12ms/step - loss: 0.0156
Epoch 14/15
3000/3000 [==============================] - 36s 12ms/step - loss: 0.0155
Epoch 15/15
3000/3000 [==============================] - 35s 12ms/step - loss: 0.0154
Learning 1-shot and predicting…
Accuracy for 1-shot: 0.5139641517298874
Learning 3-shot and predicting…
Accuracy for 3-shot: 0.5547410453543119
Learning 5-shot and predicting…
Accuracy for 5-shot: 0.6353116611989263
======= Nonlinear autoencoder with CNN encoder method: Finished =======
```

[ ]:
```
[0.5139641517298874, 0.5547410453543119, 0.6353116611989263]
```

[ ]:
```
M.test_SN(0, 40, 7, [1, 3, 5], n_iterations=4000)
```

```
======= Siamese network method: Training and evaluating… =======
Learning background…
Learning 1-shot and predicting…
Accuracy for 1-shot: 0.5956053117370332
Learning 3-shot and predicting…
Accuracy for 3-shot: 0.6809702604446034
Learning 5-shot and predicting…
Accuracy for 5-shot: 0.7265732180137191
======= Siamese network method: Finished =======
```

[ ]:
```
[0.5956053117370332, 0.6809702604446034, 0.7265732180137191]
```

[ ]:
```
M.test_SN_TL(0, 40, 7, [1, 3, 5], n_iterations=7000)
```

```
======= Siamese network with triplet loss method: Training and evaluating…
=======
```

```
Learning background…
Learning 1-shot and predicting…
Accuracy for 1-shot: 0.6534865717858631
Learning 3-shot and predicting…
Accuracy for 3-shot: 0.7348471303414983
Learning 5-shot and predicting…
Accuracy for 5-shot: 0.7427378467044438
======= Siamese network with triplet loss method: Finished =======
```

[ ]: [0.6534865717858631, 0.7348471303414983, 0.7427378467044438]