

MLP

3/3 - 0s - loss: 3.4500 - accuracy: 0.8000 - 31ms/epoch - 10ms/step
>3.450, 0.800

loss: 4.0986 - accuracy: 0.7333 - 33ms/epoch - 11ms/step
>4.099, 0.733

3/3 - 0s - loss: 3.5461 - accuracy: 0.7926 - 33ms/epoch - 11ms/step
>3.546, 0.793

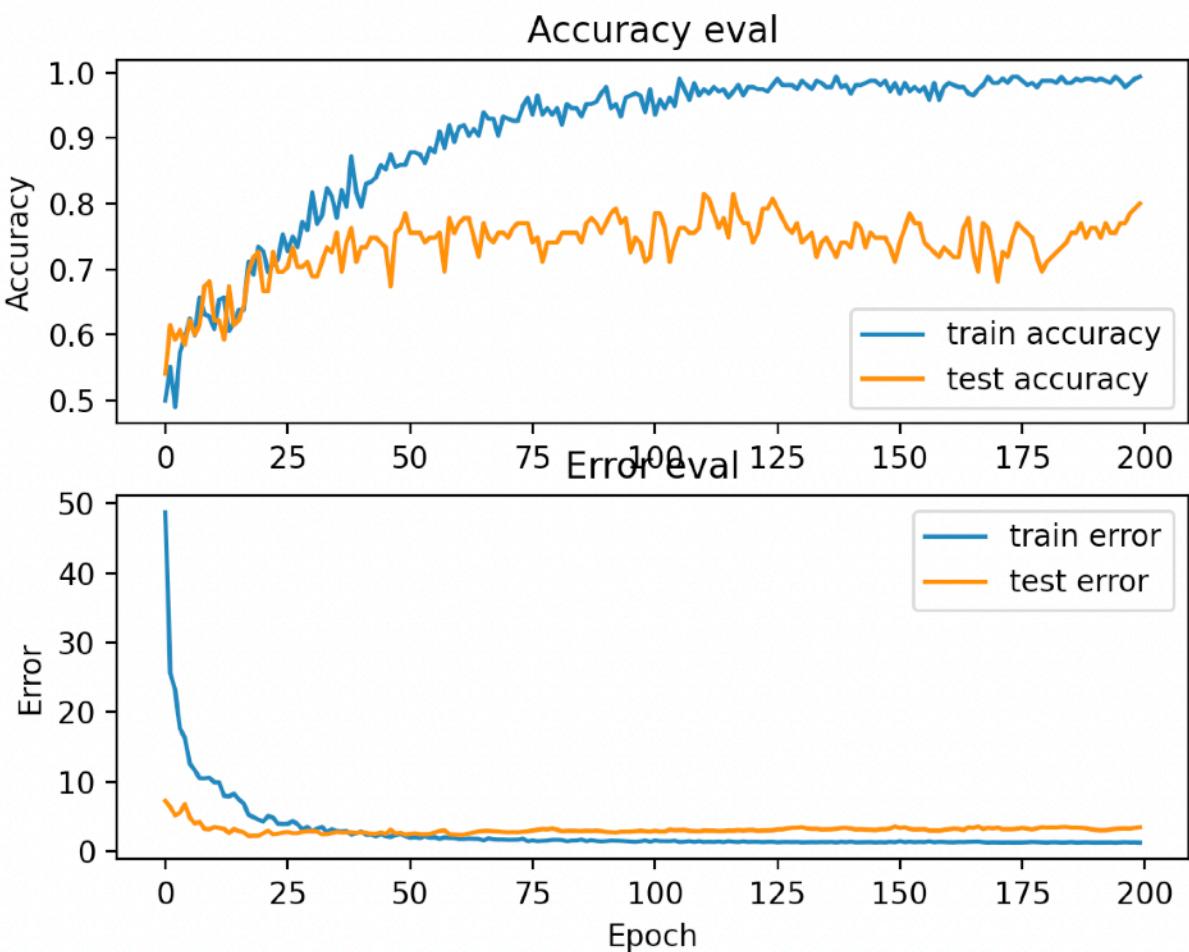
3/3 - 0s - loss: 3.4004 - accuracy: 0.7481 - 32ms/epoch - 11ms/step
>3.400, 0.748

Test accuracy: 0.7481481432914734

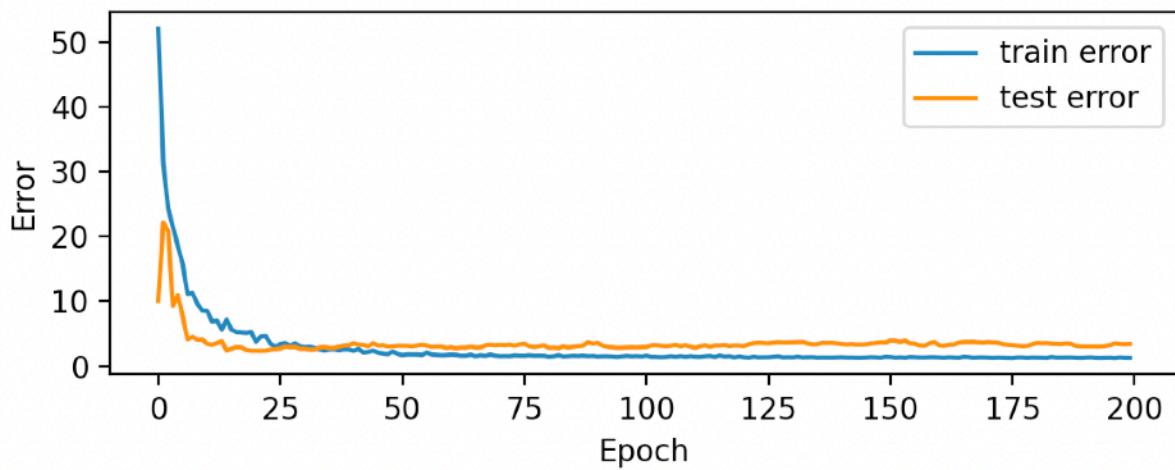
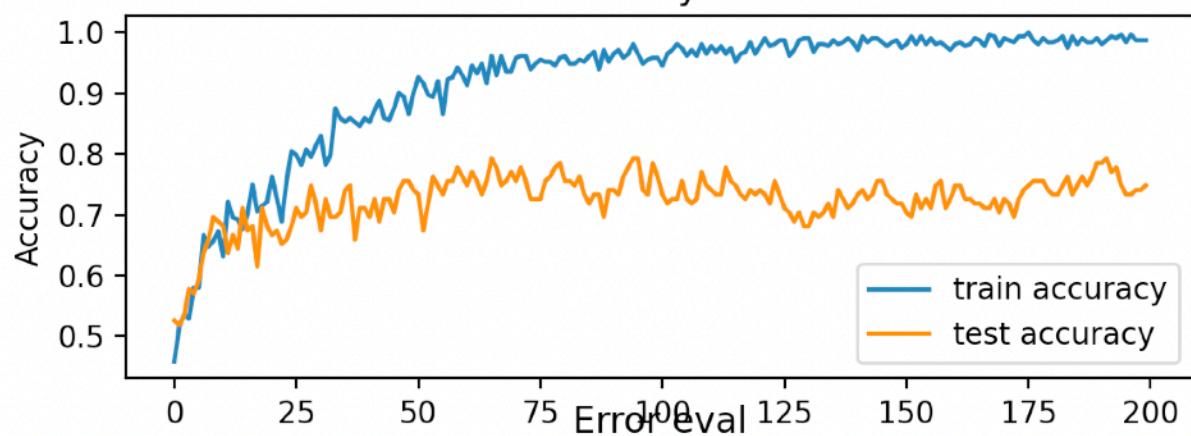
3/3 - 0s - loss: 3.3832 - accuracy: 0.8222 - 33ms/epoch - 11ms/step
>3.383, 0.822

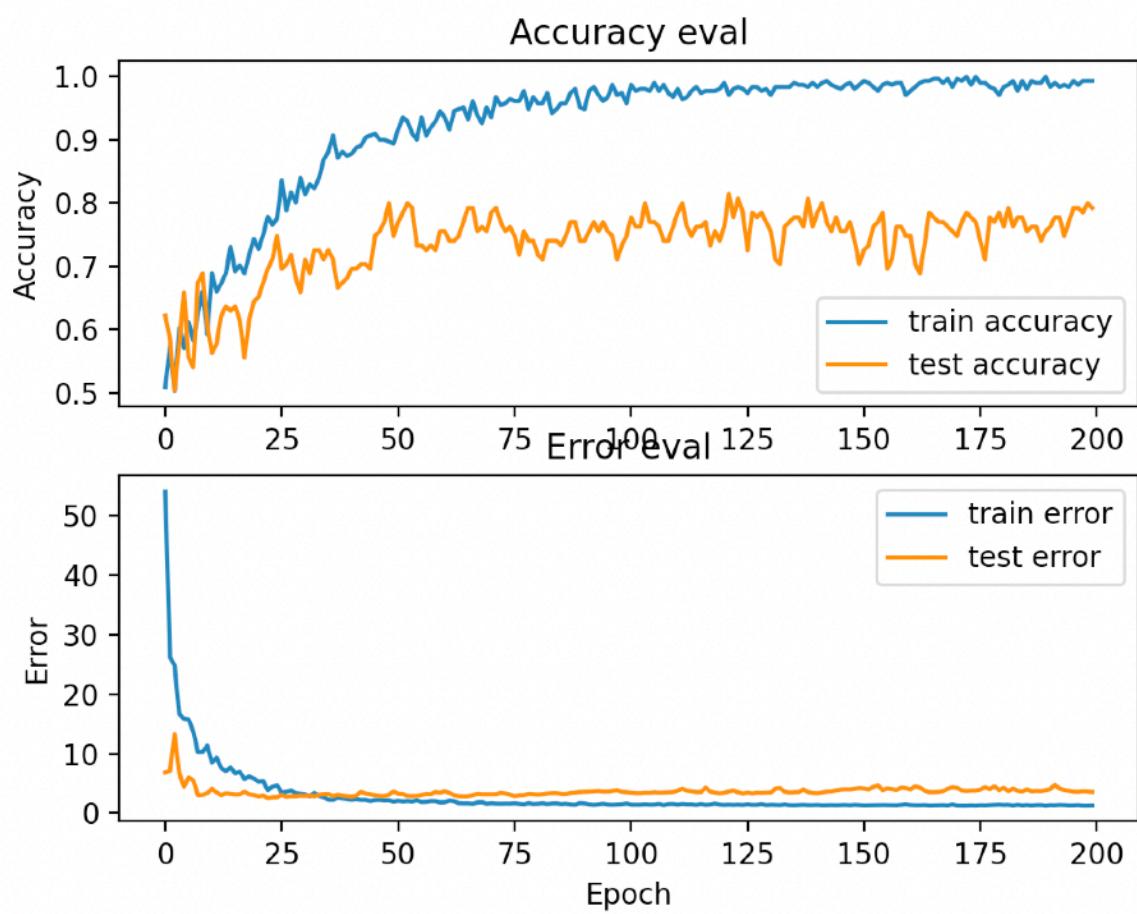
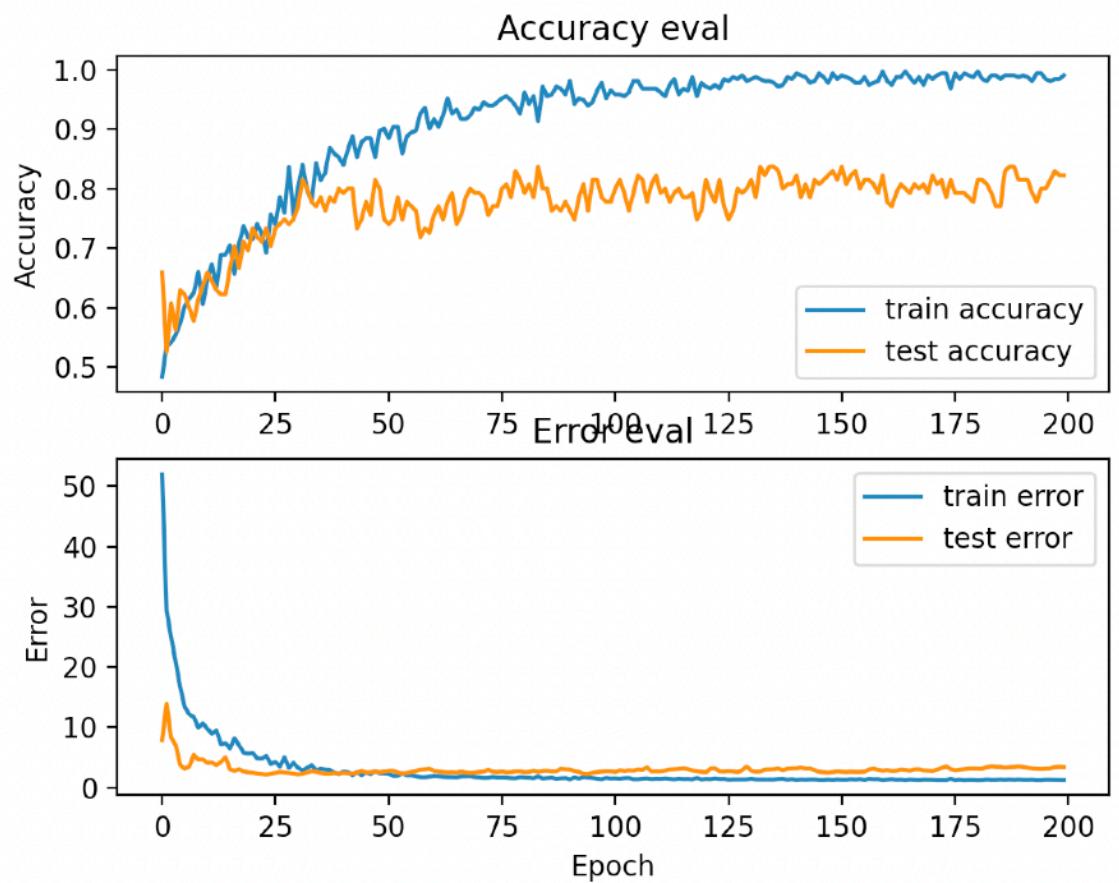
Test accuracy: 0.8222222328186035

wangkai@wangkaideiMac scripts-final %



Accuracy eval





CNN

5/5 - 0s - loss: 0.3898 - accuracy: 0.8519 - 338ms/epoch - 68ms/step

Test accuracy: 0.8518518805503845

5/5 - 0s - loss: 0.4736 - accuracy: 0.8074 - 295ms/epoch - 59ms/step

Test accuracy: 0.8074073791503906

5/5 - 0s - loss: 0.4476 - accuracy: 0.8519 - 287ms/epoch - 57ms/step

Test accuracy: 0.8518518805503845

5/5 - 0s - loss: 0.5292 - accuracy: 0.8148 - 322ms/epoch - 64ms/step

Test accuracy: 0.8148148059844971

5/5 - 0s - loss: 0.4111 - accuracy: 0.8519 - 330ms/epoch - 66ms/step

Test accuracy: 0.8518518805503845

5/5 - 0s - loss: 0.3898 - accuracy: 0.8519 - 338ms/epoch - 68ms/step

Test accuracy: 0.8518518805503845

5/5 - 0s - loss: 0.4736 - accuracy: 0.8074 - 295ms/epoch - 59ms/step

Test accuracy: 0.8074073791503906

5/5 - 0s - loss: 0.4476 - accuracy: 0.8519 - 287ms/epoch - 57ms/step

Test accuracy: 0.8518518805503845

5/5 - 0s - loss: 0.5292 - accuracy: 0.8148 - 322ms/epoch - 64ms/step

Test accuracy: 0.8148148059844971

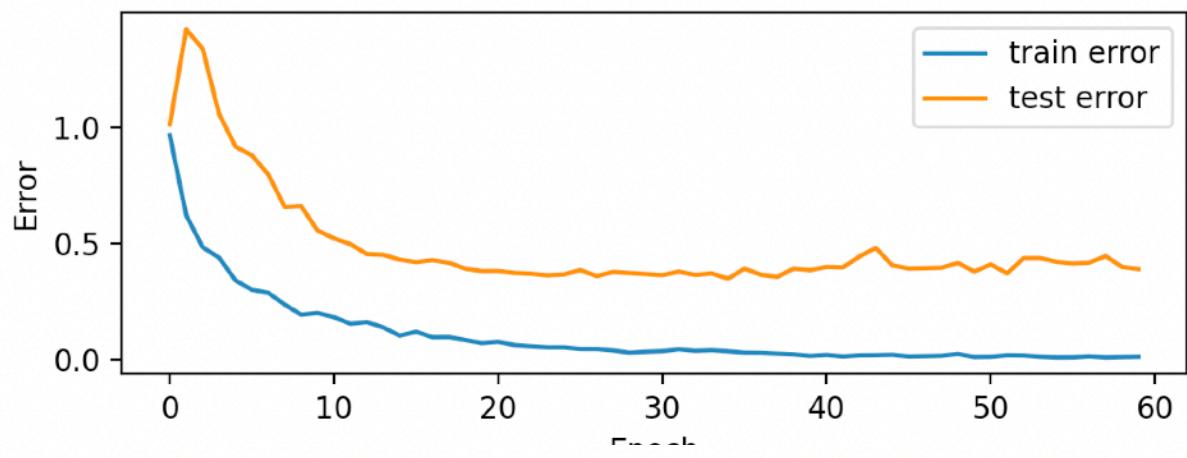
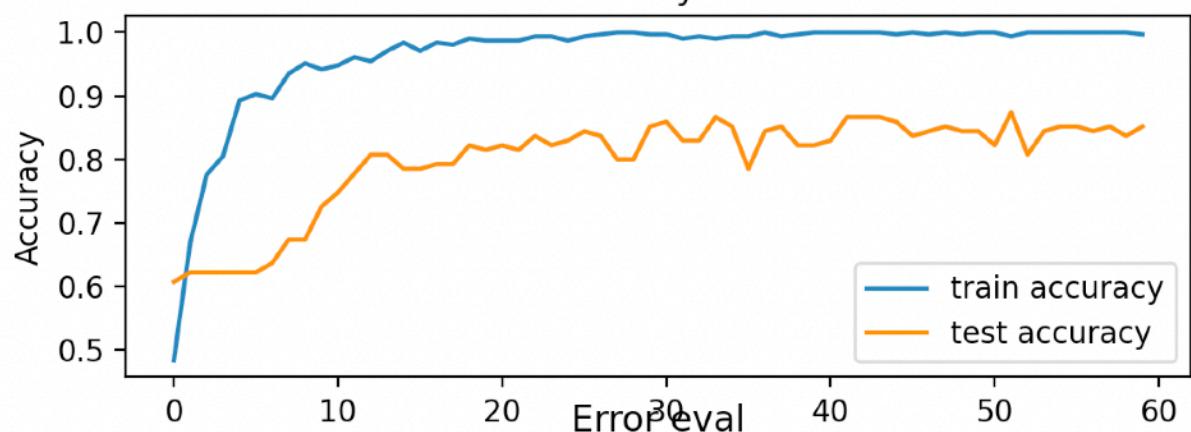
5/5 - 0s - loss: 0.4111 - accuracy: 0.8519 - 330ms/epoch - 66ms/step

Test accuracy: 0.8518518805503845

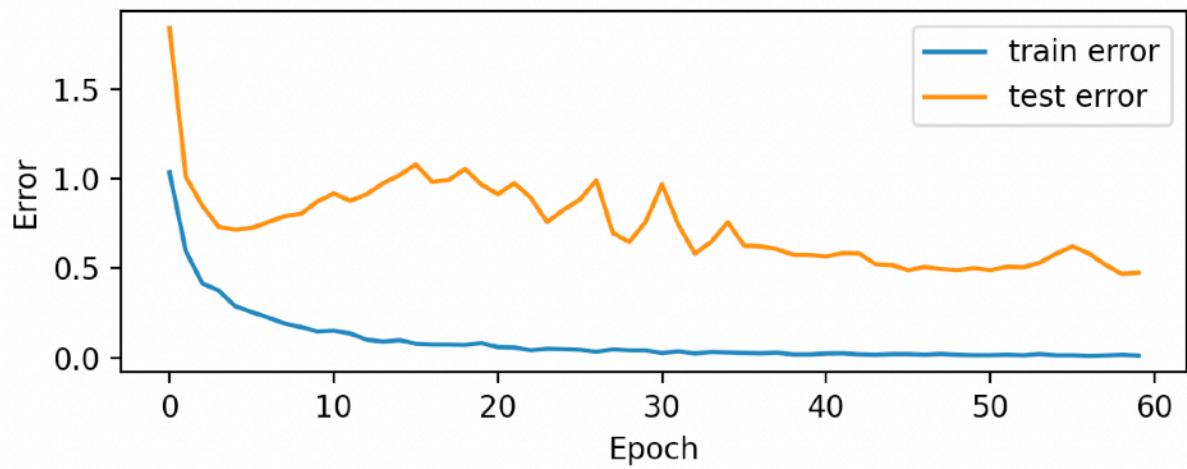
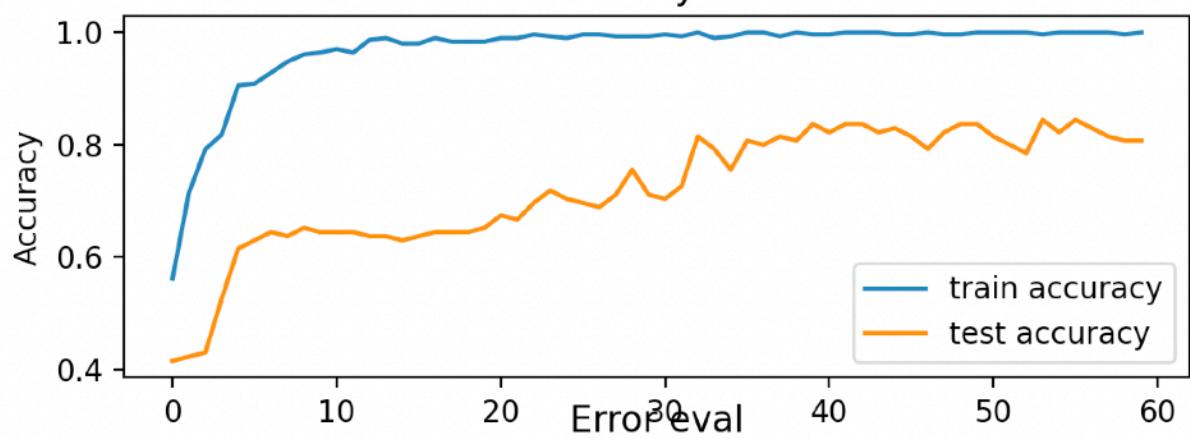
5/5 - 0s - loss: 0.5504 - accuracy: 0.8222 - 441ms/epoch - 88ms/step

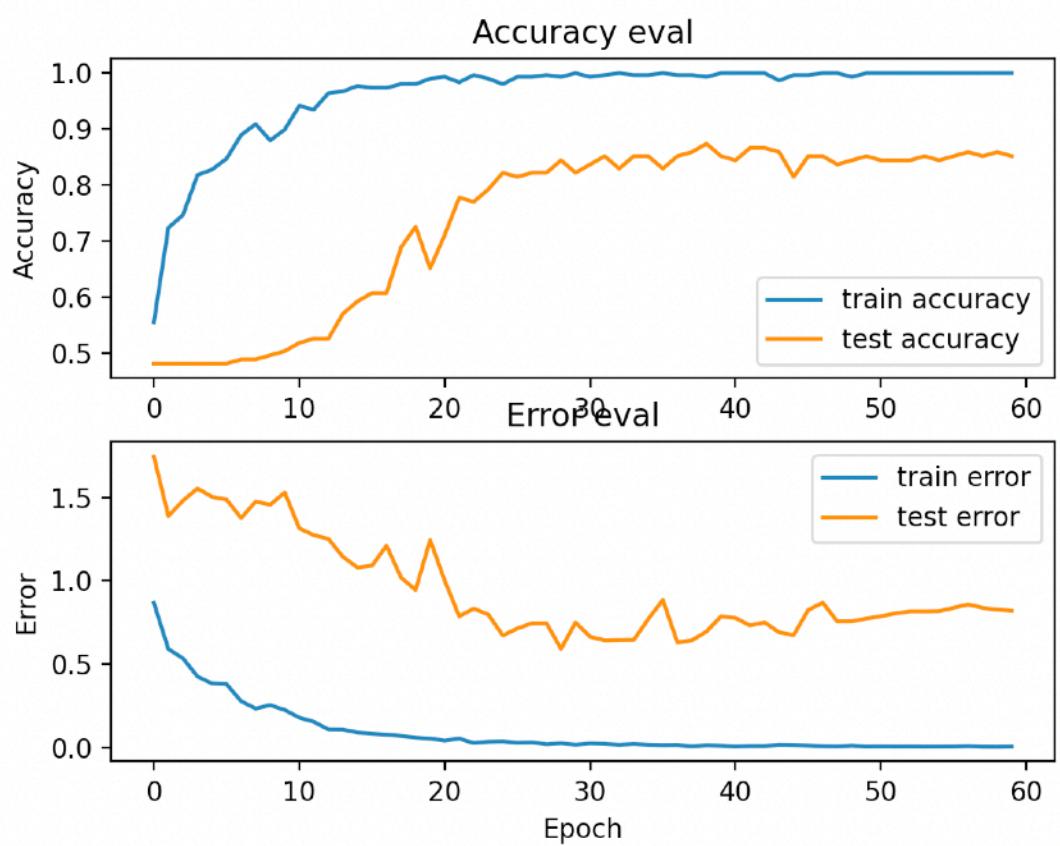
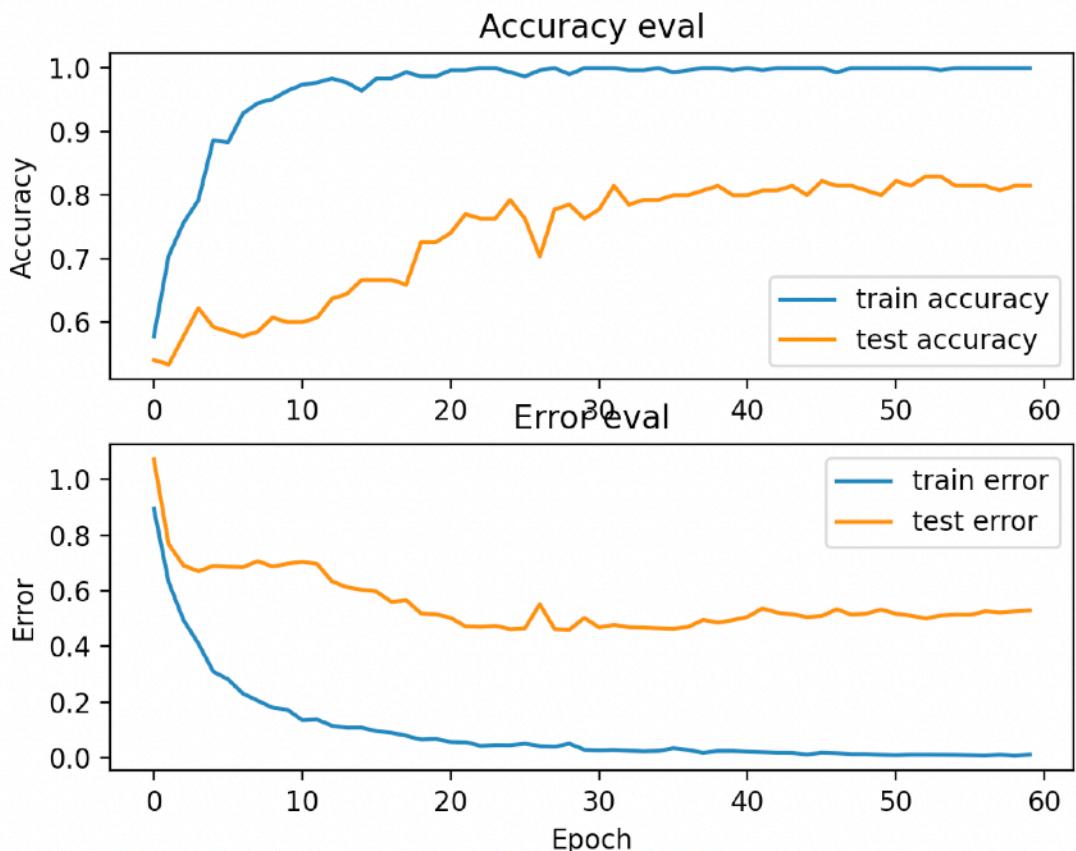
Test accuracy: 0.8222222328186035

Accuracy eval

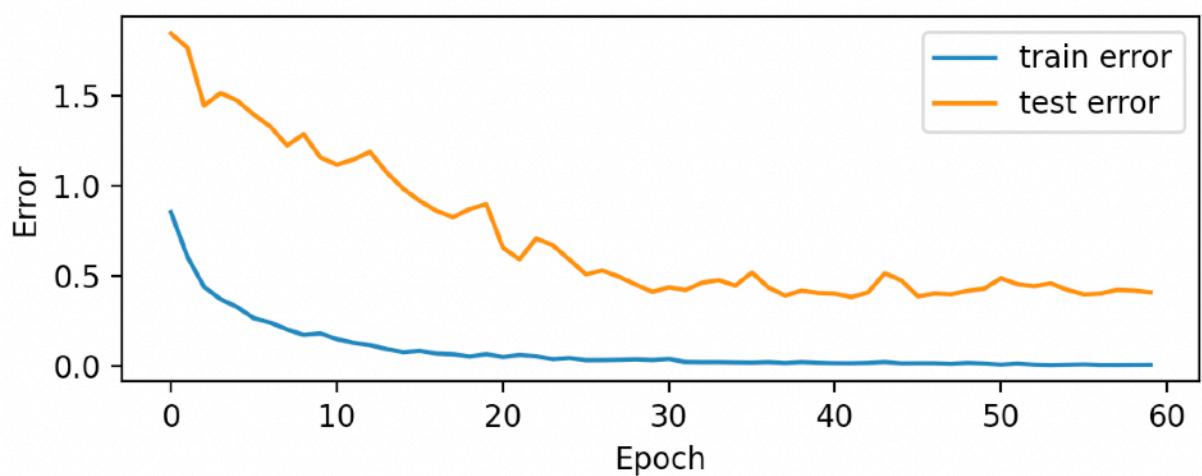
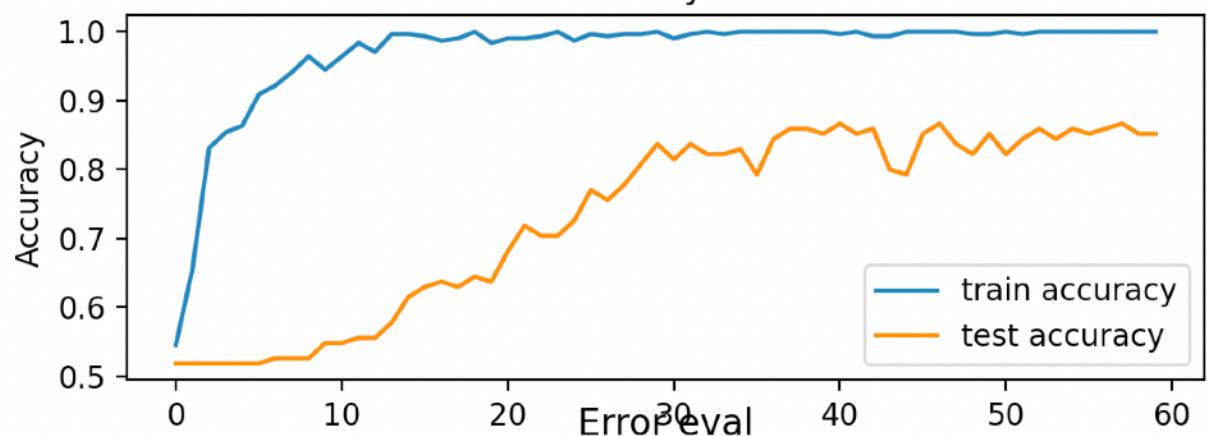


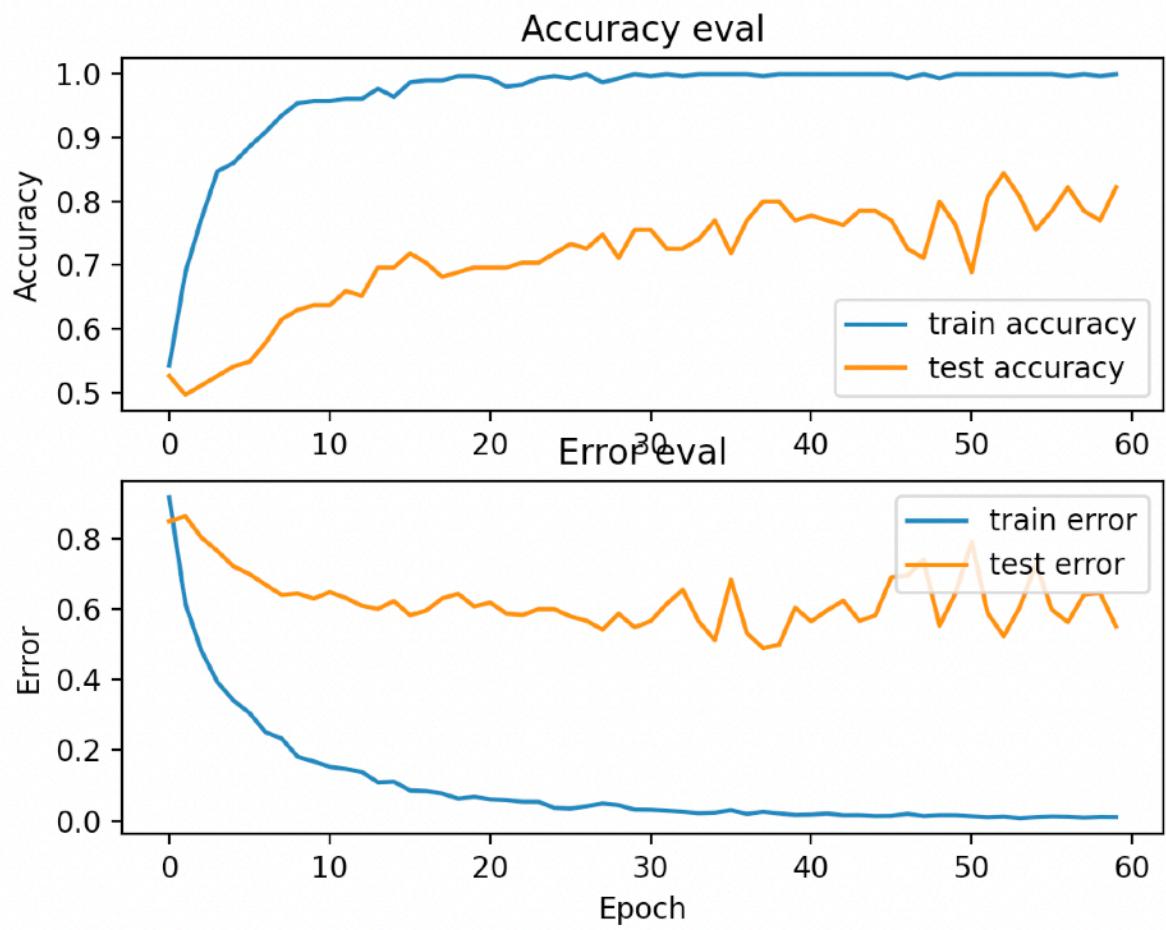
Accuracy eval





Accuracy eval





CNN- fine tune the MLP part.

5/5 - 0s - loss: 0.8191 - accuracy: 0.8519 - 398ms/epoch - 80ms/step

Test accuracy: 0.8518518805503845

RNN

5/5 - 1s - loss: 0.6923 - accuracy: 0.8222 - 568ms/epoch - 114ms/step

Test accuracy: 0.8222222328186035

5/5 - 1s - loss: 0.7658 - accuracy: 0.7926 - 530ms/epoch - 106ms/step

Test accuracy: 0.7925925850868225

5/5 - 1s - loss: 0.4787 - accuracy: 0.8667 - 536ms/epoch - 107ms/step

Test accuracy: 0.8666666746139526

5/5 - 1s - loss: 0.6663 - accuracy: 0.8444 - 668ms/epoch - 134ms/step

Test accuracy: 0.8444444537162781

5/5 - 1s - loss: 0.6213 - accuracy: 0.8222 - 675ms/epoch - 135ms/step

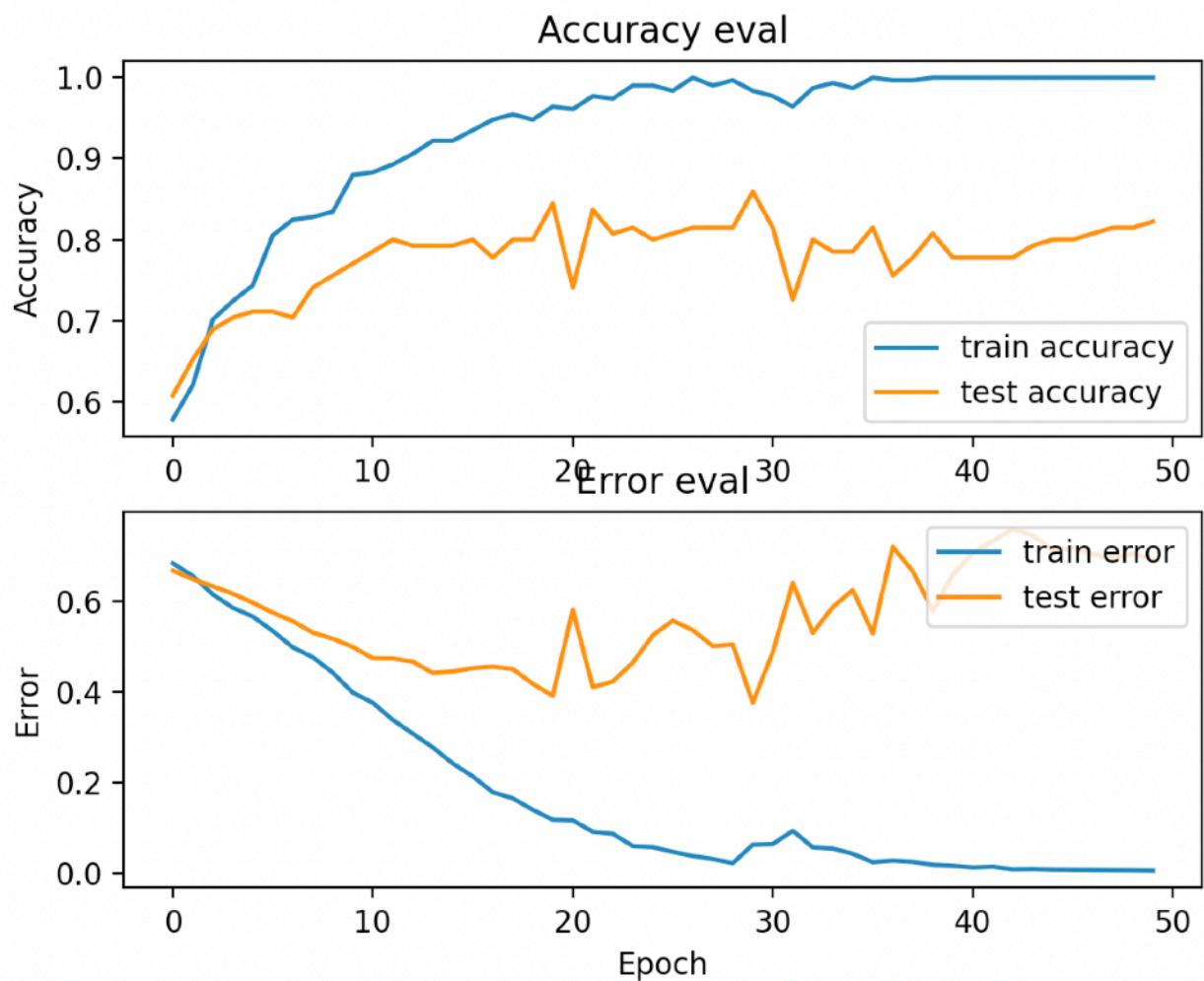
Test accuracy: 0.8222222328186035

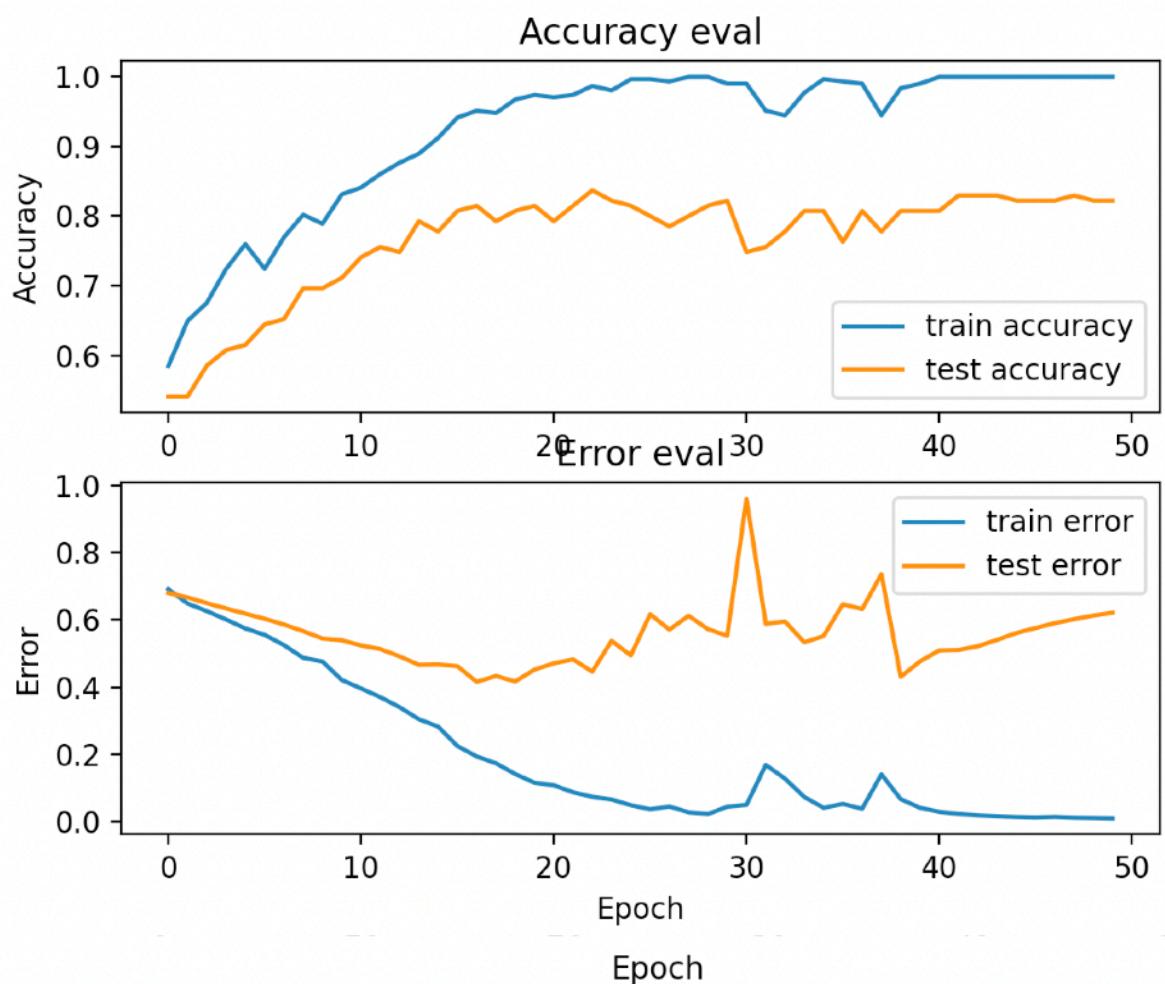
5/5 - 1s - loss: 0.6712 - accuracy: 0.8148 - 711ms/epoch - 142ms/step

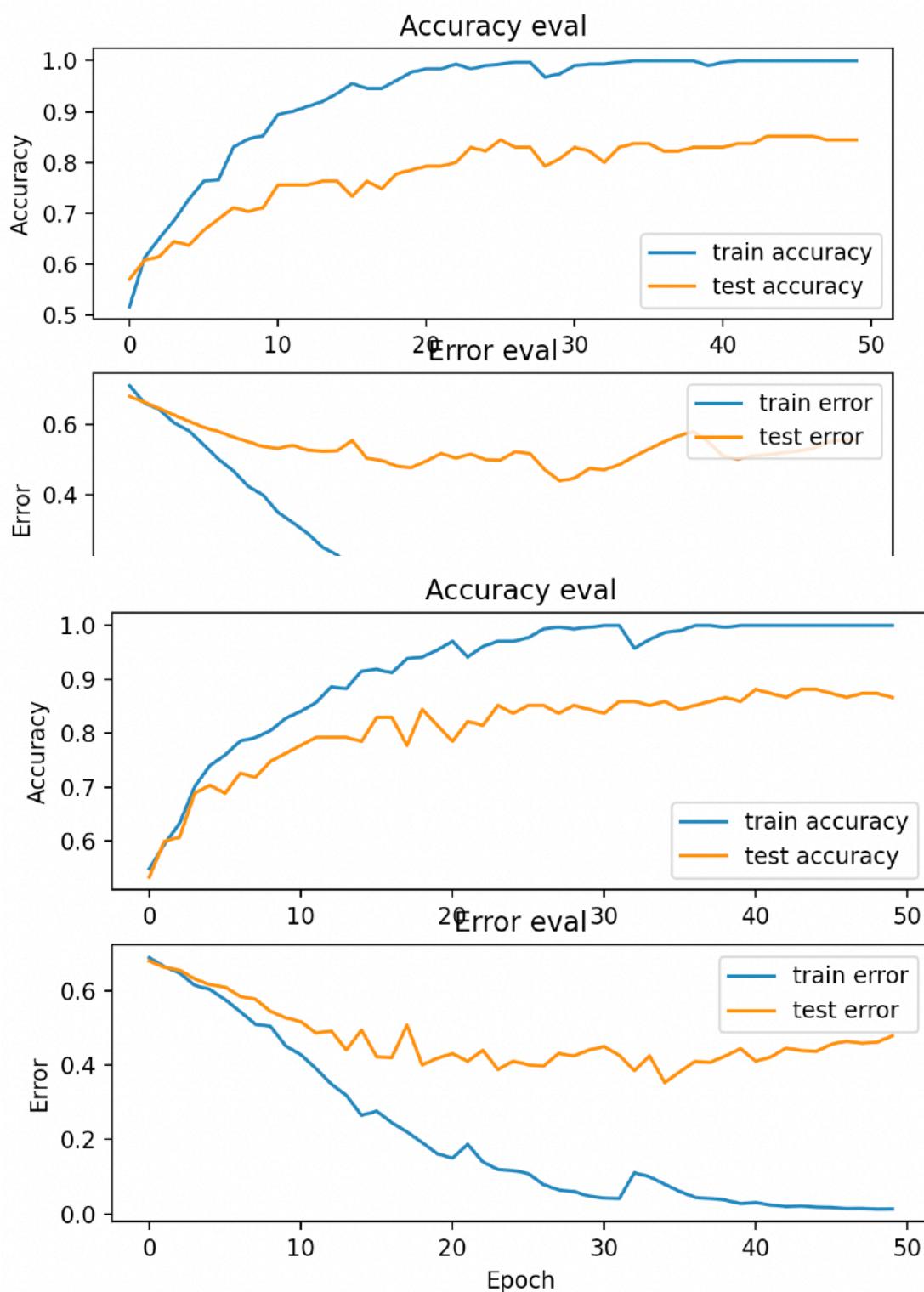
Test accuracy: 0.8148148059844971

5/5 - 1s - loss: 0.7727 - accuracy: 0.8370 - 601ms/epoch - 120ms/step

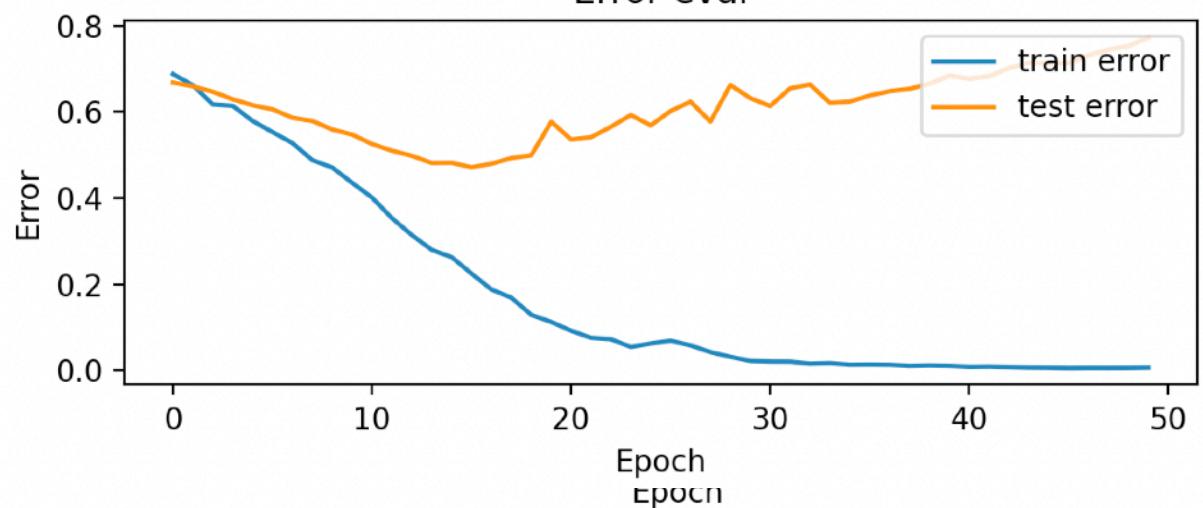
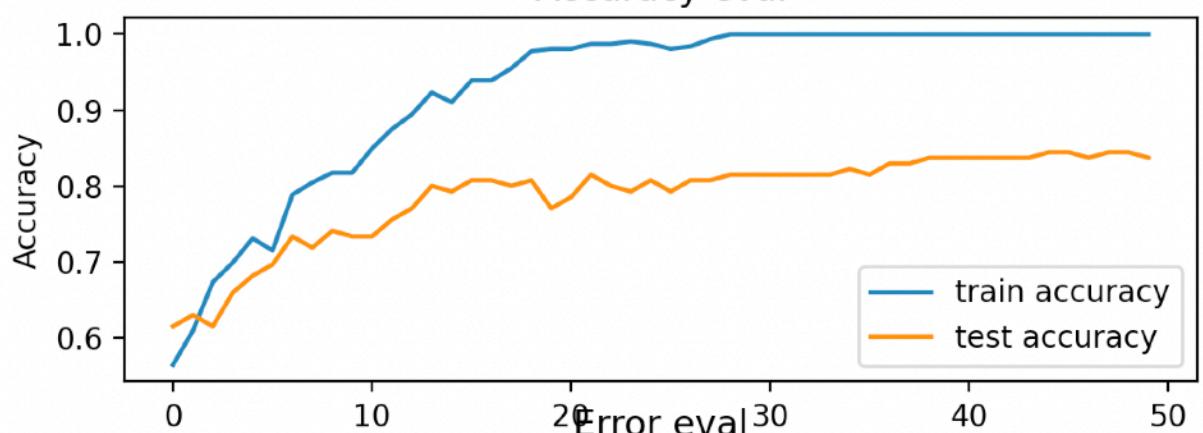
Test accuracy: 0.8370370268821716



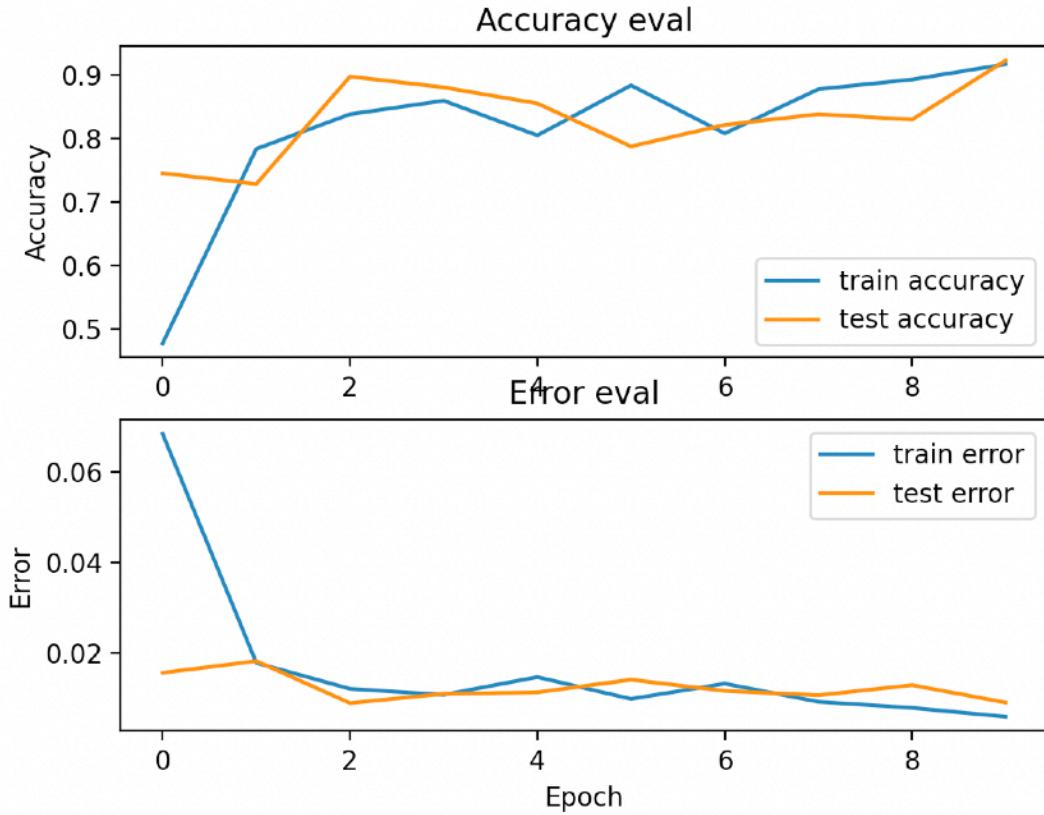




Accuracy eval



ResNet



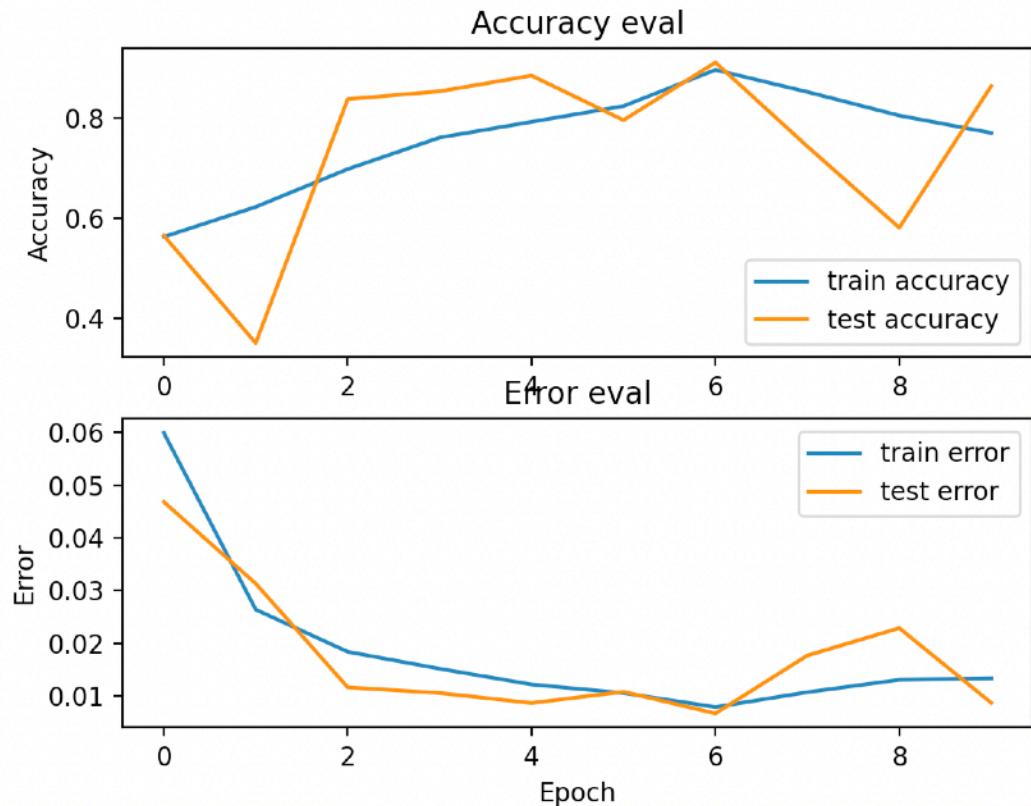
```
RESNET result: {'train_loss': [array(0.06833757, dtype=float32), array(0.01782352, dtype=float32),
array(0.0121136, dtype=float32), array(0.01080276, dtype=float32), array(0.01469998, dtype=float32),
array(0.00988138, dtype=float32), array(0.01325809, dtype=float32), array(0.00924501, dtype=float32),
array(0.0079036, dtype=float32), array(0.0059675, dtype=float32)], 'train_acc': [0.47720364741641336,
0.78419452887538, 0.8389057750759878, 0.8601823708206687, 0.8054711246200608,
0.8844984802431611, 0.8085106382978723, 0.878419452887538, 0.8936170212765957,
0.9179331306990881], 'test_loss': [0.015642338432371616, 0.018231889453984924,
0.008959733517998355, 0.01100333142331091, 0.011337292396416098, 0.014113187024338265,
0.011659697519015457, 0.01069242756624343, 0.012931890880404893, 0.009077382273972034],
'test_acc': [0.7457627118644068, 0.7288135593220338, 0.8983050847457628, 0.8813559322033898,
0.8559322033898306, 0.788135593220339, 0.8220338983050848, 0.8389830508474576,
0.8305084745762712, 0.923728813559322]}
```

```
RESNET result: {'train_loss': [0.058842360973358154, 0.020055178552865982, 0.011813398450613022,
0.009901436045765877, 0.008442774415016174, 0.009431769140064716, 0.01224534772336483,
0.010900854133069515, 0.010944156907498837, 0.006730932742357254], 'train_acc':
[0.6170212765957447, 0.7689969604863222, 0.8297872340425532, 0.851063829787234,
0.8693009118541033, 0.8753799392097265, 0.8632218844984803, 0.8693009118541033,
0.8358662613981763, 0.9270516717325228], 'test_loss': [0.014062830389051114,
0.014331899583339691, 0.008212340869388338, 0.008475872861631846, 0.013983190880488541,
0.017985130265607673, 0.009885804696103274, 0.00989167682700238, 0.008308532568862883,
0.012952728417970367], 'test_acc': [0.8220338983050848, 0.8135593220338984,
0.8983050847457628, 0.864406779661017, 0.8220338983050848, 0.7627118644067796,
0.8389830508474576, 0.8559322033898306, 0.9067796610169492, 0.8559322033898306]}
```

```
RESNET result: {'train_loss': [0.05990111827850342, 0.02638678252696991, 0.01839219406247139,
0.015173686668276787, 0.012190470471978188, 0.010569581761956215, 0.007898007519543171,
```

```
0.010725745931267738, 0.0130739975720644, 0.013366635888814926], 'train_acc':  
[0.5628930817610063, 0.6226415094339622, 0.6981132075471698, 0.7610062893081762,  
0.7924528301886793, 0.8238993710691824, 0.8962264150943396, 0.8522012578616353,  
0.8050314465408805, 0.7704402515723271], 'test_loss': [0.04681402502376684,  
0.03131215968681256, 0.011652670527627956, 0.010571210874312835, 0.008664612643693755,  
0.01081232660259876, 0.006695862703454432, 0.017680945079676144, 0.02288357398584875,  
0.008709022707027914], 'test_acc': [0.5654450261780105, 0.3507853403141361, 0.837696335078534,  
0.8534031413612565, 0.8848167539267016, 0.7958115183246073, 0.9109947643979057,  
0.743455497382199, 0.581151832460733, 0.8638743455497382]}
```





VIT

```
Epoch: 1 | train_loss: 0.6168 | train_acc: 0.6591 | test_loss: 0.5027 |  
test_acc: 0.8281  
10%|███████████  
| 1/10 [02:36<23:31, 156.82s/it] Epoch: 2 | train_loss: 0.5116 |  
train_acc: 0.7399 | test_loss: 0.4529 | test_acc: 0.8125  
20%|███████████  
| 2/10 [05:12<20:48, 156.10s/it] Epoch: 3 | train_loss: 0.4552 |  
train_acc: 0.8223 | test_loss: 0.3940 | test_acc: 0.8359  
30%|███████████  
| 3/10 [07:47<18:10, 155.85s/it] Epoch: 4 | train_loss: 0.4341 |  
train_acc: 0.8191 | test_loss: 0.3669 | test_acc: 0.8359  
40%|███████████  
| 4/10 [15:08<26:49, 268.27s/it] Epoch: 5 | train_loss: 0.4045 |  
train_acc: 0.8138 | test_loss: 0.3602 | test_acc: 0.8516  
50%|███████████  
| 5/10 [32:12<45:03, 540.80s/it] Epoch: 6 | train_loss: 0.3599 |  
train_acc: 0.8636 | test_loss: 0.3379 | test_acc: 0.8438  
60%|███████████  
| 6/10 [49:14<46:56, 704.24s/it]  
  
Epoch: 7 | train_loss: 0.3520 | train_acc: 0.8580 | test_loss: 0.3219 |  
test_acc: 0.8984  
70%|███████████  
| 7/10 [58:02<32:19, 646.63s/it] Epoch: 8 | train_loss: 0.3512 |  
train_acc: 0.8535 | test_loss: 0.3086 | test_acc: 0.8906  
80%|███████████  
| 8/10 [1:00:41<16:22, 491.41s/it] Epoch: 9 | train_loss: 0.3404 |  
train_acc: 0.8690 | test_loss: 0.3001 | test_acc: 0.8984  
90%|███████████  
| 9/10 [1:03:20<06:27, 387.64s/it] Epoch:
```

```
10 | train_loss: 0.3322 | train_acc: 0.8605 | test_loss: 0.2956 |
test_acc: 0.8906
100%|███████████| 10/10 [1:05:59<00:00, 395.94s/it]
print3
{'train_loss': [0.6167936325073242, 0.5115945881063287,
0.45520632375370373, 0.43407672372731293, 0.4045283225449649,
0.35989108139818365, 0.35197484357790515, 0.3511538126251914,
0.3404282968152653, 0.33220993930643256], 'train_acc':
[0.6590909090909091, 0.73989898989899, 0.8222853535353536,
0.8191287878787878, 0.8137626262626263, 0.8636363636363636,
0.8579545454545454, 0.8535353535353536, 0.8690025252525253,
0.8604797979797981, 'test_loss': [0.5027154311537743,
0.45291534066200256, 0.39401902072131634, 0.3669127747416496,
0.360199473798275, 0.3379350323230028, 0.321881553158164,
0.308591790497303, 0.30014515202492476, 0.29559988621622324],
'test_acc': [0.828125, 0.8125, 0.8359375, 0.8359375, 0.8515625, 0.84375,
0.8984375, 0.890625, 0.8984375, 0.890625]}
<class 'dict'>
pretrained result: {'train_loss': [0.6167936325073242,
0.5115945881063287, 0.45520632375370373, 0.43407672372731293,
0.4045283225449649, 0.35989108139818365, 0.35197484357790515,
0.3511538126251914, 0.3404282968152653, 0.33220993930643256],
'train_acc': [0.6590909090909091, 0.73989898989899, 0.8222853535353536,
0.8191287878787878, 0.8137626262626263, 0.8636363636363636,
0.8579545454545454, 0.8535353535353536, 0.8690025252525253,
0.8604797979797981, 'test_loss': [0.5027154311537743,
0.45291534066200256, 0.39401902072131634, 0.3669127747416496,
0.360199473798275, 0.3379350323230028, 0.321881553158164,
0.308591790497303, 0.30014515202492476, 0.29559988621622324],
'test_acc': [0.828125, 0.8125, 0.8359375, 0.8359375, 0.8515625,
0.84375, 0.8984375, 0.890625, 0.8984375, 0.890625]}
```

```
Epoch: 1 | train_loss: 0.6304 | train_acc: 0.6325 | test_loss: 0.5339 |
test_acc: 0.7750
10%|███████████| 1/10 [02:44<24:44, 164.99s/it]Epoch: 2 | train_loss: 0.5033 |
train_acc: 0.7929 | test_loss: 0.4709 | test_acc: 0.8438
20%|███████████| 2/10 [05:27<21:50, 163.80s/it]Epoch: 3 | train_loss: 0.4462 |
train_acc: 0.8117 | test_loss: 0.4226 | test_acc: 0.8812
30%|███████████| 3/10 [08:10<19:03, 163.35s/it]Epoch: 4 | train_loss: 0.4123 |
train_acc: 0.8421 | test_loss: 0.3724 | test_acc: 0.8562
```

```
40%|██████████
| 4/10 [10:53<16:18, 163.09s/it]Epoch: 5 | train_loss: 0.3823 |
train_acc: 0.8585 | test_loss: 0.3533 | test_acc: 0.8875
50%|
██████████
| 5/10 [44:46<1:09:47, 837.45s/it]Epoch: 6 | train_loss: 0.3649 |
train_acc: 0.8677 | test_loss: 0.3282 | test_acc: 0.8625
60%|
██████████
| 6/10 [48:43<42:13, 633.40s/it]Epoch: 7 | train_loss: 0.3474 |
train_acc: 0.8556 | test_loss: 0.3169 | test_acc: 0.8625
70%|
██████████
| 7/10 [52:42<25:13, 504.42s/it]Epoch: 8 | train_loss: 0.3404 |
train_acc: 0.8590 | test_loss: 0.3066 | test_acc: 0.8562
80%|
██████████
| 8/10 [56:43<14:00, 420.47s/it]Epoch: 9 | train_loss: 0.3351 |
train_acc: 0.8713 | test_loss: 0.3032 | test_acc: 0.8750
90%|
██████████
| 9/10 [1:00:45<06:04, 364.64s/it]Epoch: 10 | train_loss: 0.3168 |
train_acc: 0.8646 | test_loss: 0.2873 | test_acc: 0.8938
100%|
██████████
10/10 [1:04:48<00:00, 388.82s/it]
print3
{'train_loss': [0.6303902745246888, 0.5032728433609008,
0.44622028470039365, 0.4122572958469391, 0.3822949379682541,
0.3649154305458069, 0.3473534107208252, 0.34040385484695435,
0.3350747346878052, 0.3168260991573334], 'train_acc':
[0.6325000000000001, 0.7929166666666667, 0.8116666666666668,
0.8420833333333333, 0.8585416666666668, 0.8677083333333334,
0.8556250000000001, 0.858958333333334, 0.8712500000000001,
0.8645833333333334], 'test_loss': [0.5339026927947998,
0.47092571258544924, 0.42256945967674253, 0.37236179411411285,
0.3533439993858337, 0.32823420464992525, 0.3168518990278244,
0.30661158412694933, 0.3032025367021561, 0.2873386174440384],
'test_acc': [0.775, 0.84375, 0.88125, 0.85625, 0.8875, 0.8625, 0.8625,
0.85625, 0.875, 0.89375]}
<class 'dict'>
pretrained result: {'train_loss': [0.6303902745246888,
0.5032728433609008, 0.44622028470039365, 0.4122572958469391,
0.3822949379682541, 0.3649154305458069, 0.3473534107208252,
```

```
0.34040385484695435, 0.3350747346878052, 0.3168260991573334],  
'train_acc': [0.6325000000000001, 0.7929166666666667,  
0.8116666666666668, 0.8420833333333333, 0.8585416666666668,  
0.8677083333333334, 0.8556250000000001, 0.8589583333333334,  
0.8712500000000001, 0.8645833333333334], 'test_loss':  
[0.5339026927947998, 0.47092571258544924, 0.42256945967674253,  
0.37236179411411285, 0.3533439993858337, 0.32823420464992525,  
0.3168518990278244, 0.30661158412694933, 0.3032025367021561,  
0.2873386174440384], 'test_acc': [0.775, 0.84375, 0.88125, 0.85625,  
0.8875, 0.8625, 0.8625, 0.875, 0.89375]}
```

