Project 6 report

Lingyi Song

Files:

model.py – for MNIST dataset.

notMnist_model.py – for notMNIST dataset.

- MNIST dataset

Parameters for the training:

Learning rate = 0.01

Batch size = 64

Max epochs = 30

Optimizer = SGD

Learnable weights/bias:

Initialize with 4 weights and 4 bias. They are

"w": nn.parameter(np.random.uniform(-0.1, 0.1, [n_features,512])),

"b": nn.parameter.zeros([512]),

"w1": nn.parameter(np.random.uniform(-0.1, 0.1,[512, 256])),

"b1": nn.parameter.zeros([256]),

"w2": nn.parameter(np.random.uniform(-0.1, 0.1,[256, 128])),

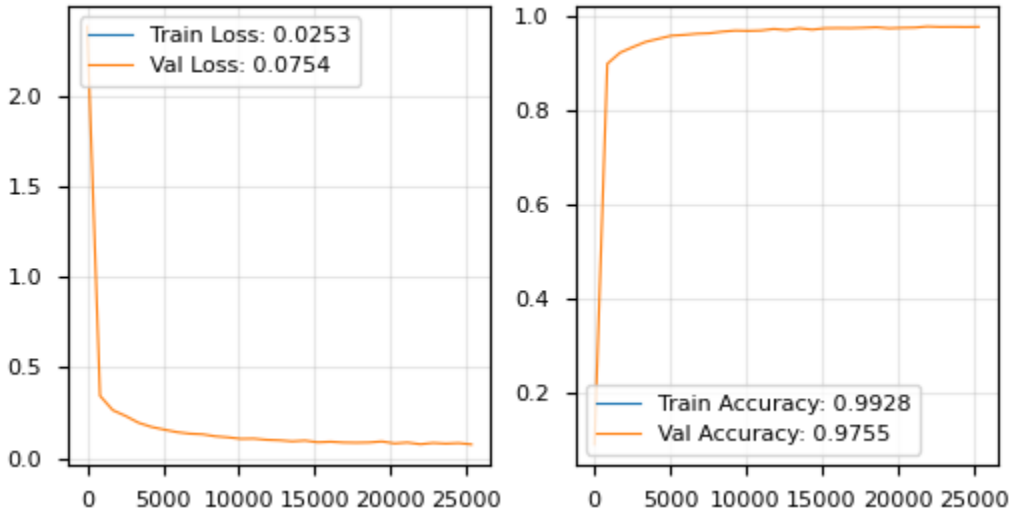
"b2": nn.parameter.zeros([128]),

"w3": nn.parameter(np.random.uniform(-0.1, 0.1,[128, n_classes])),

"b3": nn.parameter.zeros([n_classes])

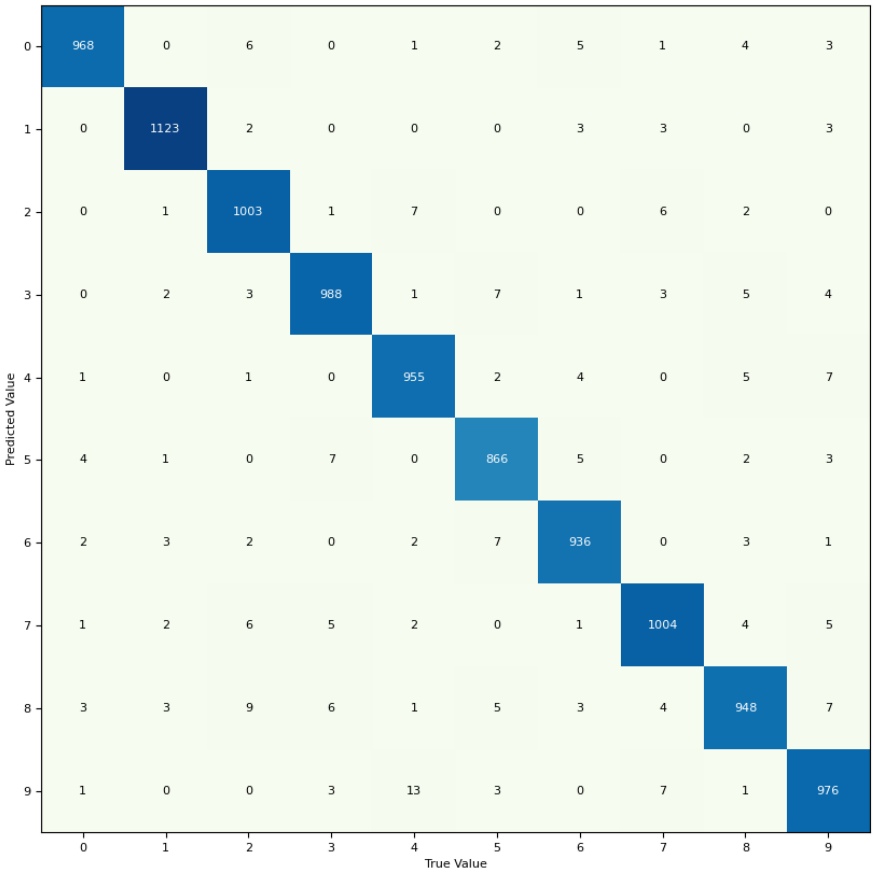
The loss function: softmax_cross_entropy_loss

The outcome of this training:



(Didn't plot the training accuracy of every step for better running performance.)

Testing:



Test accuracy is 0.9767

```
Test...
Test Accuracy: 0.9767
```

- notMNIST dataset

Parameters for the training:

Learning rate = 0.1

Batch size = 32

Max epochs = 30

Optimizer = SGD

Learnable weights/bias:

Initialize with 3 weights and 3 bias. They are

"w": nn.parameter(np.random.uniform(-0.1, 0.1, [n_features,512])),

"b": nn.parameter.zeros([512]),

"w1": nn.parameter(np.random.uniform(-0.05, 0.05,[512, 256])),

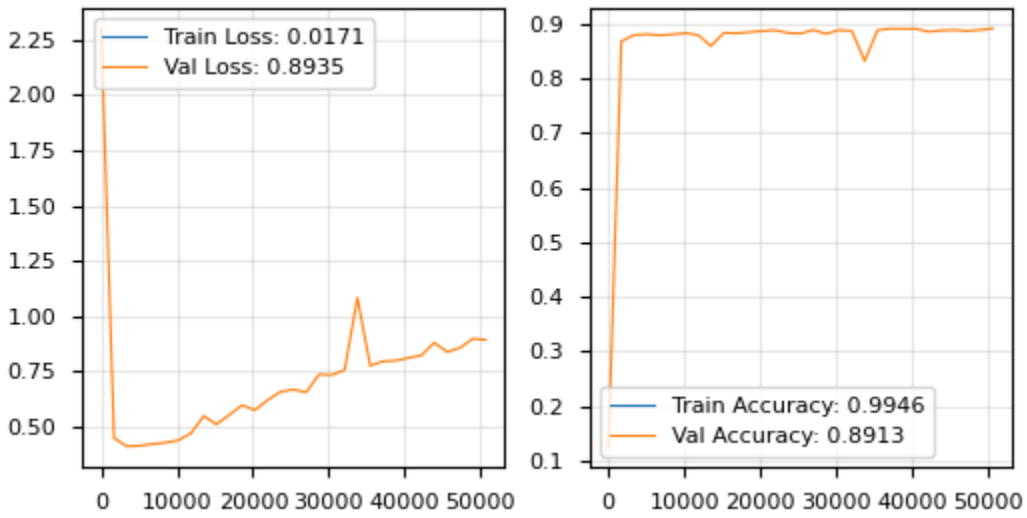
"b1": nn.parameter.zeros([256]),

"w2": nn.parameter(np.random.uniform(-0.01, 0.01,[256, n_classes])),

"b2": nn.parameter.zeros([n_classes]),

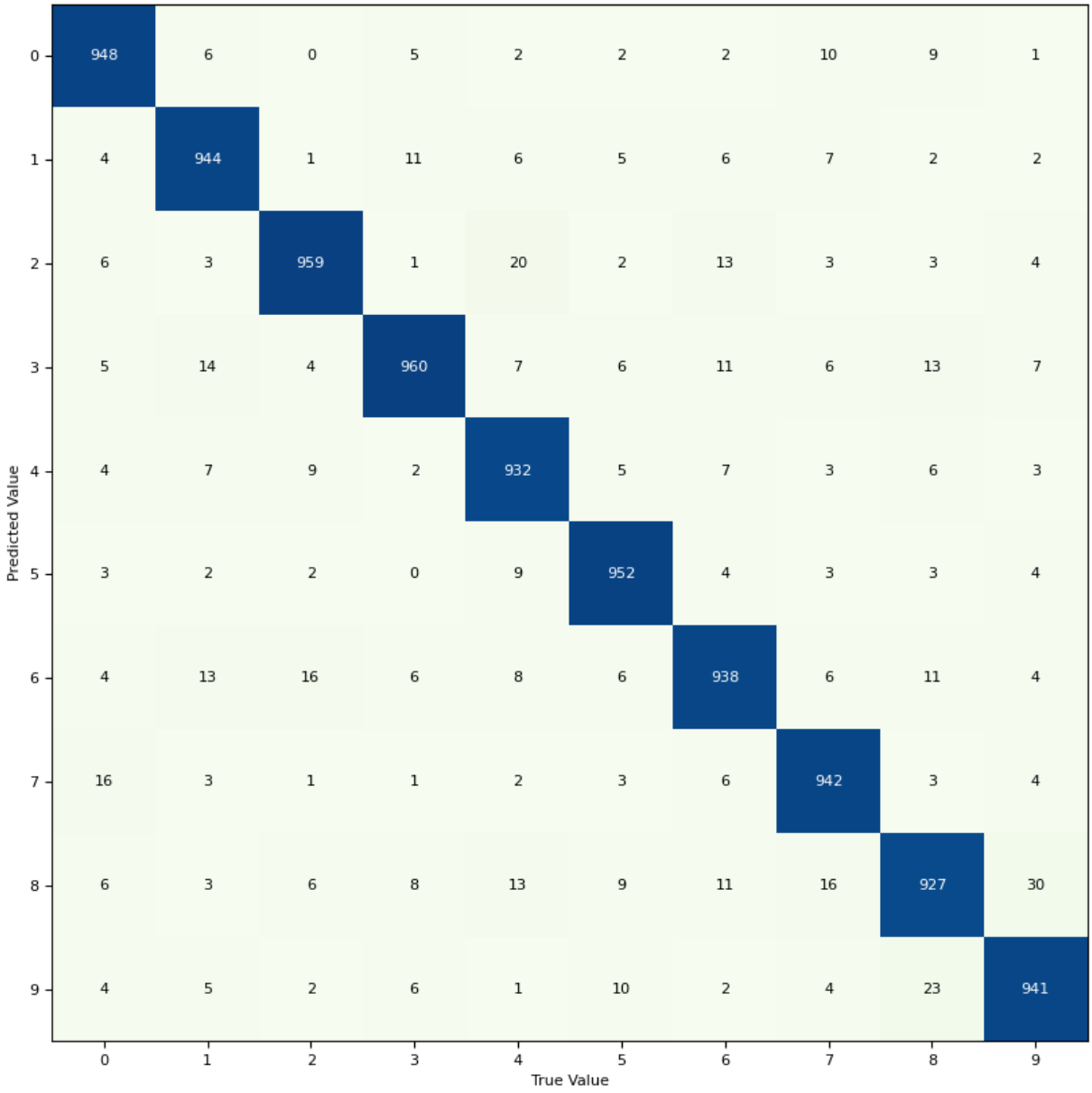
The loss function: softmax_cross_entropy_loss

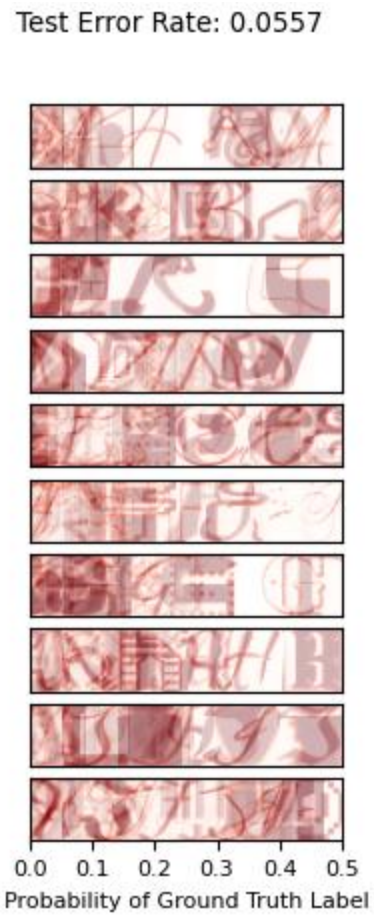
The outcome of this training:



(Didn't plot the training accuracy of every step for better running performance.)

Testing:


Predicted Value
True Value
0 948 6 0 5 2 2 2 10 9 1
1 4 944 1 11 6 5 6 7 2 2
2 6 3 959 1 20 2 13 3 3 4
3 5 14 4 960 7 6 11 6 13 7
4 4 7 9 2 932 5 7 3 6 3
5 3 2 2 0 9 952 4 3 3 4
6 4 13 16 6 8 6 938 6 11 4
7 16 3 1 1 2 3 6 942 3 4
8 6 3 6 8 13 9 11 16 927 30
9 4 5 2 6 1 10 2 4 23 941
0 1 2 3 4 5 6 7 8 9




```
poch: 29/30
 54016/54000 [============] - ETA: 11s - loss: 0.0224 - acc: 0.9933 - val_loss: 0.8985 - val_acc: 0.8887
poch: 30/30
 54016/54000 [============] - ETA: 11s - loss: 0.0171 - acc: 0.9946 - val_loss: 0.8935 - val_acc: 0.8913
est...
est Accuracy: 0.9443
```

The final testing accuracy is 0.9443.