

Practical work 05

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EXERCICE IMPLEMENT FORWARD PROPAGATION

When the mini-batch size is small it takes longer to compute, because there are more to update for each mini-batch size.

- Exec time for batchsize 1:160.19426887499867
- Exec time for batchsize 10:30.34420301101636
- Exec time for batchsize 100:8.943757677043322
- Exec time for batchsize 1000:9.295862502011005
- Exec time for batchsize 10000:9.679265380953439
- Exec time for batchsize 60000:20.212129193008877

EXERCICE 3 IMPLEMENT BACKPROPAGATION

See backprop-stud.ipynb.

EXERCICE 4 TRAIN MNIST

SHALLOW NETWORK : SINGLE HIDDEN LAYER LAYER WITH 150 UNITS

- Elapse time: 76s.

- Layer: 100, 10 (softmax)
- epochs: 100
- batch-size: 100

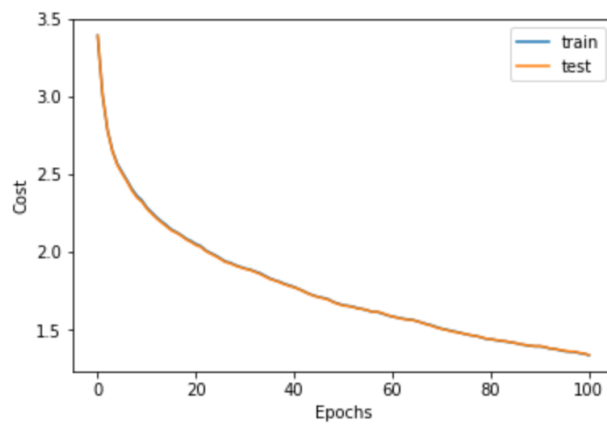
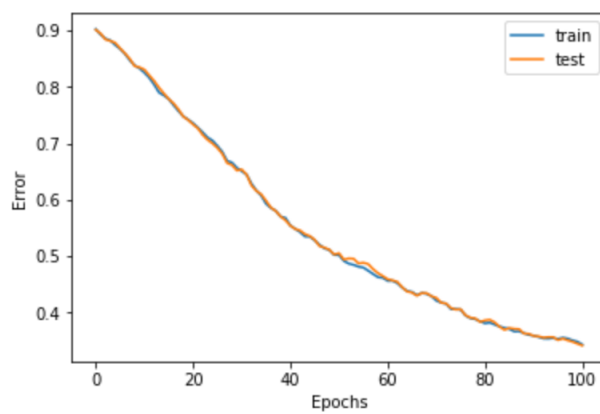


Figure 0.1:



0.3433833333333333
0.3418

Figure 0.2:

- Elapse time: 58s.
- Layer: 150, 10 (softmax)
- epochs: 100

- batch-size: 100

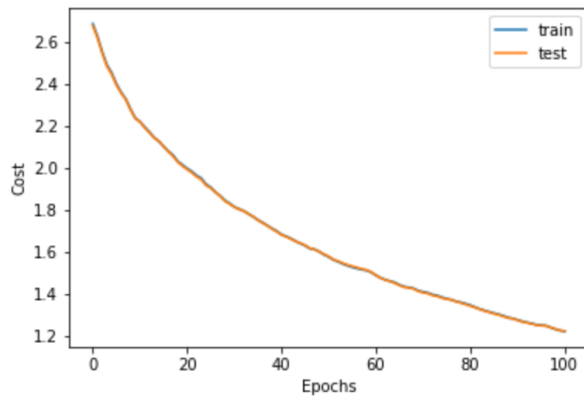
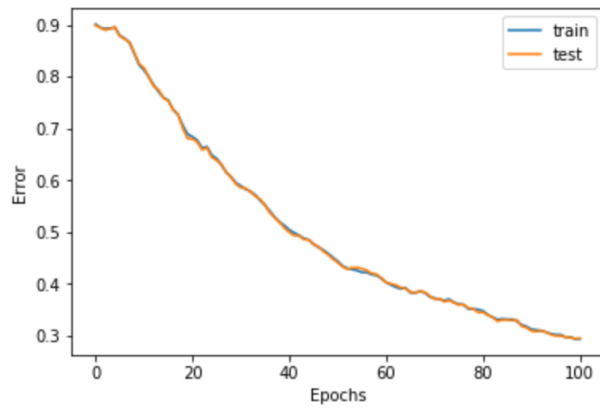


Figure 0.3:



0.2938166666666667
0.2942

Figure 0.4:

DEEPER NETWORK : FOUR HIDDEN LAYERS WITH 150, 200, 150, 50 HIDDEN LAYERS

We tested batch-size 10, 100 and 1000. We expected, that the batch-size 100 will be slower but with better results.

After running the code, the batch-size 100 gave the best result and the running time were more or less the same. We conclude, that the architecture of the network has more of an impact in this case with than the batch-size.

BATCH-SIZE 100

- Elapse time: 180s.
- epochs: 100
- batch-size: 100

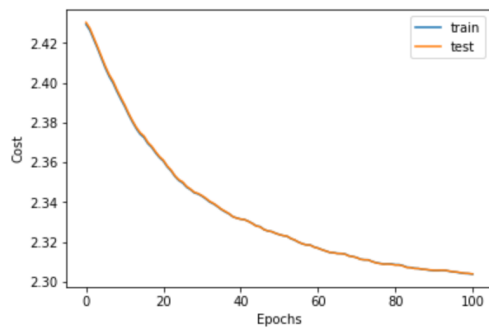
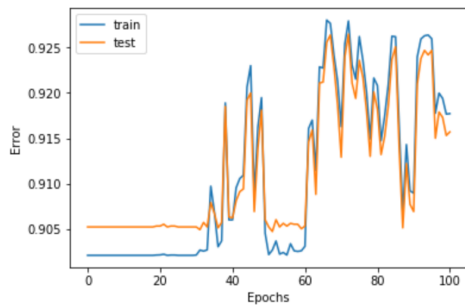


Figure 0.5:



0.9020666666666667
0.9047

Figure 0.6:

BATCH-SIZE 1000

- Elapse time: 176s.
- epochs: 100
- batch-size: 1000

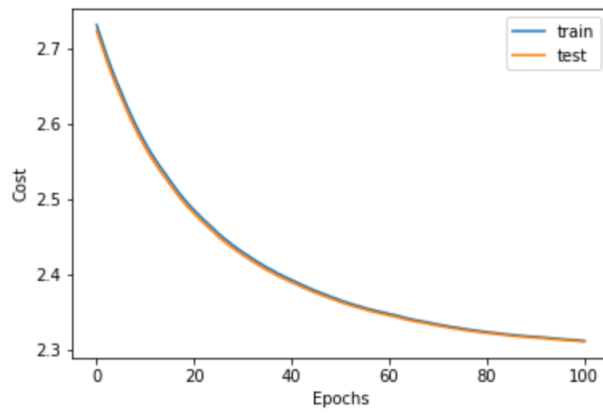
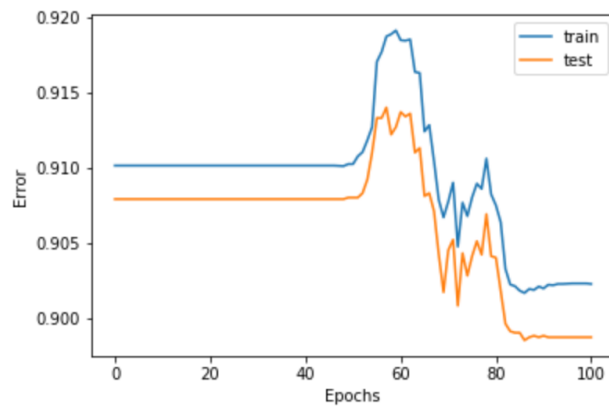


Figure 0.7:



0.90165
0.8985

Figure 0.8:

BATCH-SIZE 10

- Elapse time: 176s.
- epochs: 100
- batch-size: 10

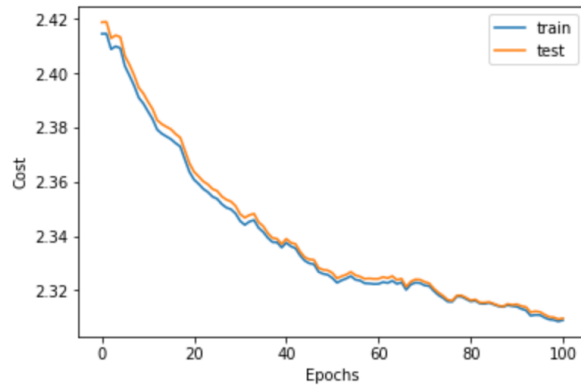
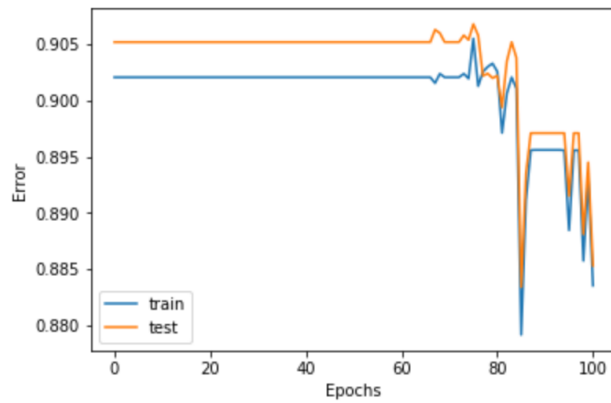


Figure 0.9:



0.87915
0.8834

Figure 0.10: