



MNIST Database

Laboratory 12

Neural Networks

Miguel Fernández Carratalá

Computer Science
Politechnika Krakowska

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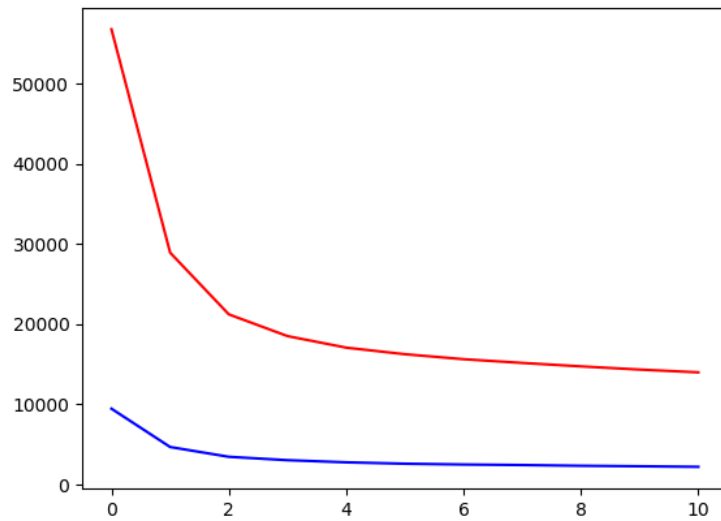
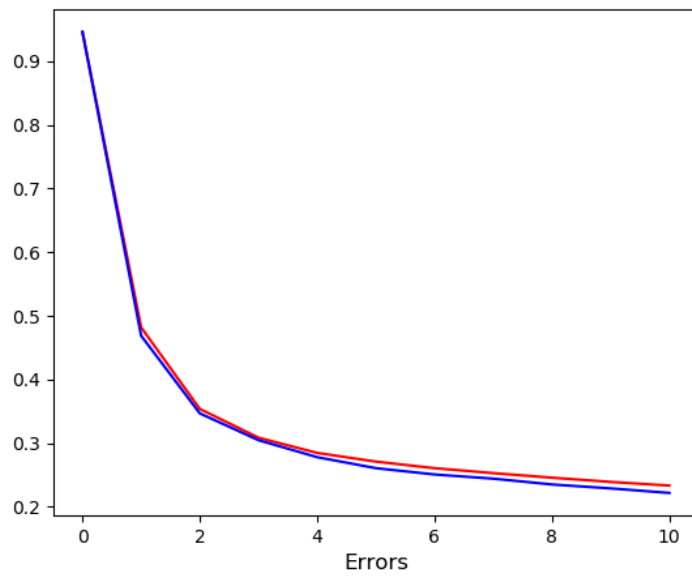
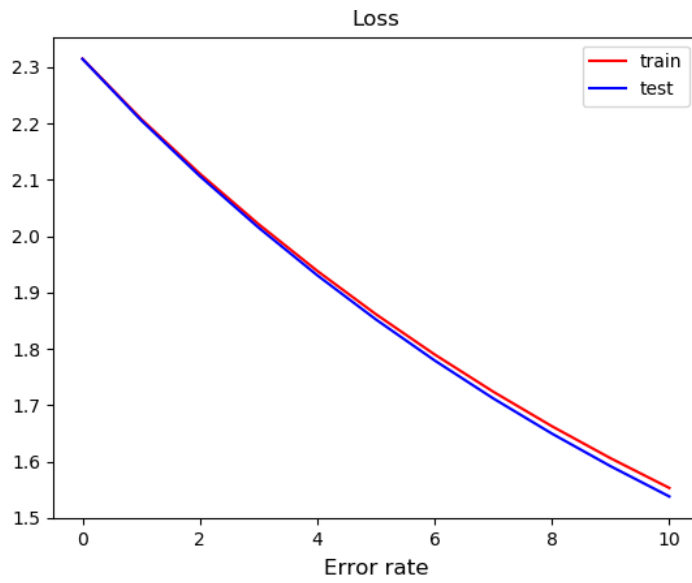
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Softmax Linear

```
dloss: 2.3147547148661394
erate: 0.9459833333333333
errors: 56759
test dloss: 2.3143767699461866
test erate: 0.9465
test errors: 9465
starting learning...
```

Best test error rate: 22.17%

```
iteration 10
dloss: 1.5529986623536052
erate: 0.23325
errors: 13995
test dloss: 1.5378862393776809
test erate: 0.2217
test errors: 2217
learning finished
Minimum training error rate: 0.23325 for iteration 10
Minimum testing error rate: 0.2217 for iteration 10
```

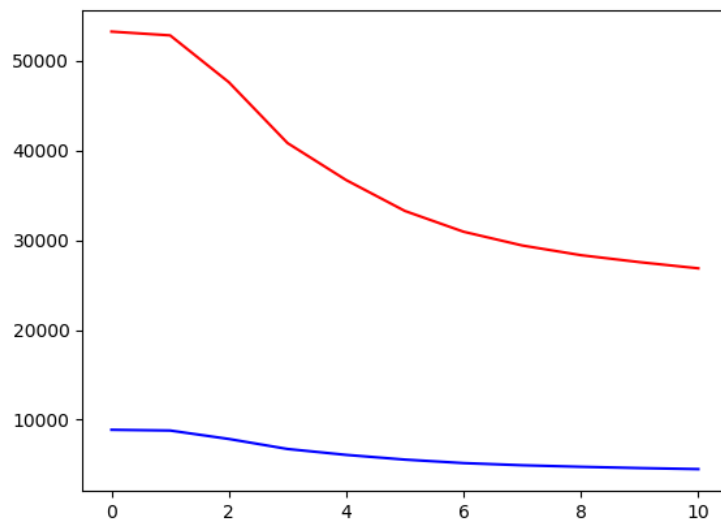
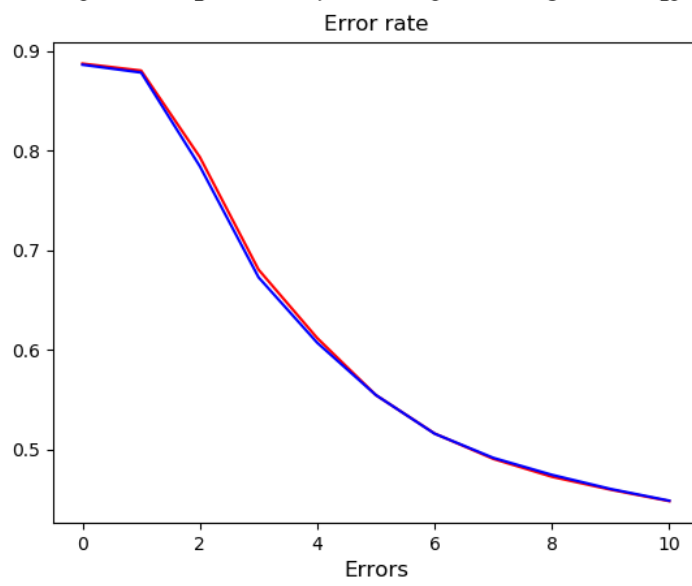
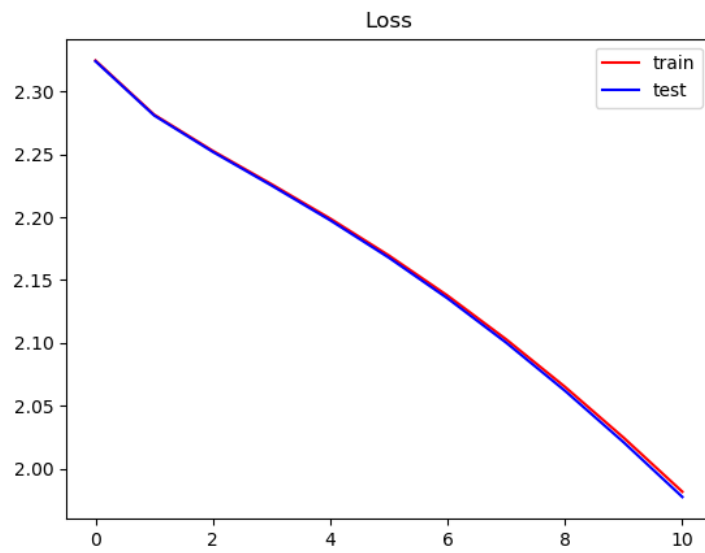


Softmax1HL

```
dloss: 2.3246583268448355
erate: 0.8876333333333334
errors: 53258
test dloss: 2.3240356990868536
test erate: 0.8865
test errors: 8865
starting learning...
```

Best test error rate: 44.82%

```
iteration 10
dloss: 1.9817155348023965
erate: 0.44776666666666665
errors: 26866
test dloss: 1.97754489417988
test erate: 0.4482
test errors: 4482
learning finished
Minimum training error rate: 0.44776666666666665 for iteration 10
Minimum testing error rate: 0.4482 for iteration 10
```



Softmax2HL with Regularization

```
dloss: 2.3477924348368266
erate: 0.90085
errors: 54051
test dloss: 2.3464896031145757
test erate: 0.8991
test errors: 8991
starting learning...
```

Best test error rate: 89.91%

```
iteration 10
eta 0.1
dloss: 2.324300303543091
erate: 0.90085
errors: 54051
test dloss: 2.323337227715131
test erate: 0.8991
test errors: 8991
learning finished
Minimum training error rate: 0.90085 for iteration 0
Minimum testing error rate: 0.8991 for iteration 0
```

