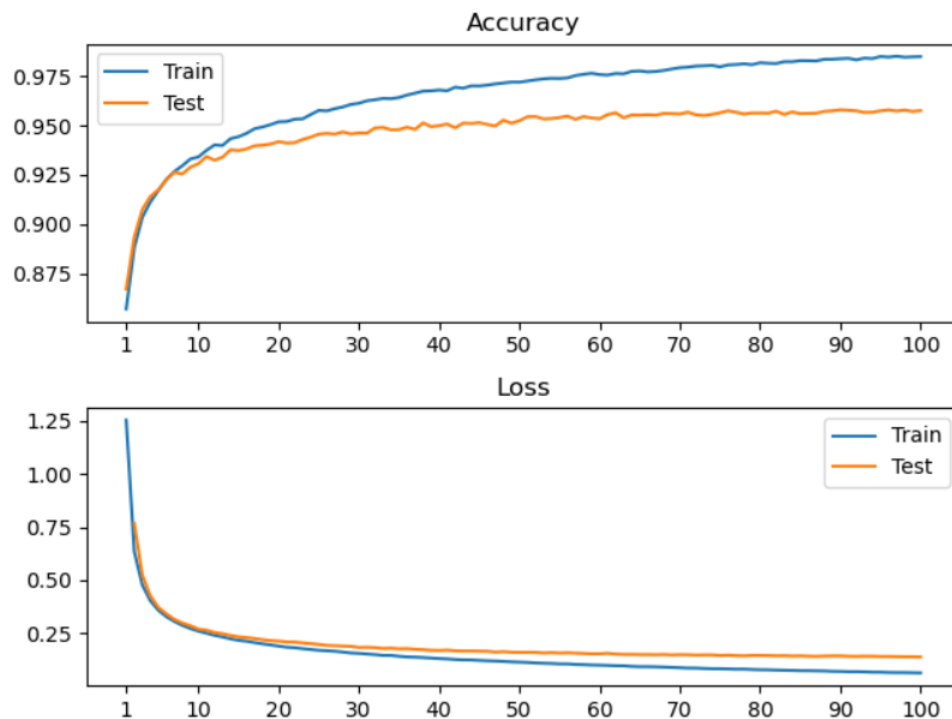# Pattern Recognition - Exercise 2d (CNN & MLP)

Implementation details and Testing details

- See Report of Exercise 2b (MLP)

- See Report of Exercise 2c (CNN)

Results for MLP permutated

- Number of iterations: 100

- Hidden layer size: 100

- Learning rate: 0.001

- Train accuracy: 98.48%

- Test accuracy: 95.75%

- Train loss: 0.062085

- Test loss: 0.137676

Comparision between MLP with normal dataset and MLP with permutated dataset
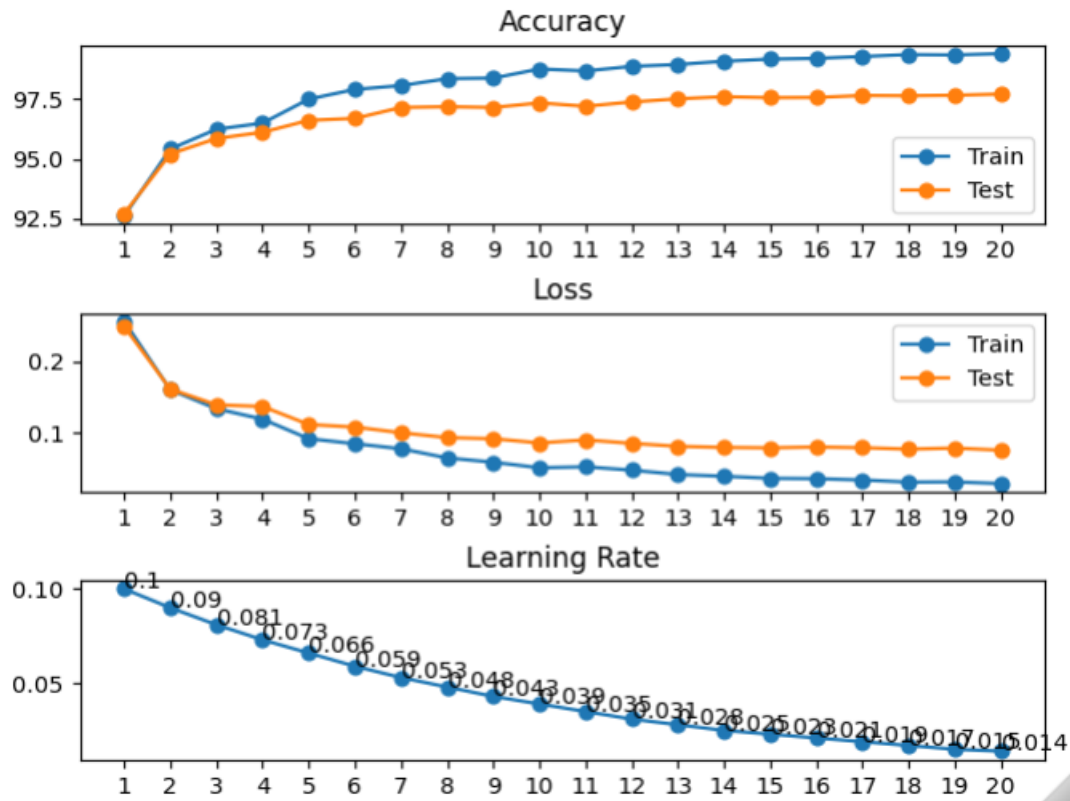
- The accuracy is slighly bigger with the permutated MNIST dataset (95.75% vs 95.68%)

- The loss is slighly lower with the permutated MNIST dataset

- We clearly see that having the dataset permutated for the classification with the MLP is not a problem. We even have (very slightly) better results with this two particular runs. If the permutation is always the same on each images, there would be no reason that the algorithm not to recognize the digits, because each pixel is taken into account independently.

Results for CNN permutated

- Number of epochs: 10

- Initial learning rate: 0.1

- Accuracy: 97.71%

	Accuracy		Loss	
Epoch	Train Dataset	Test Dataset	Train Dataset	Test Dataset
1	92.60%	92.70%	0.2568	0.2495
2	95.41%	95.20%	0.1604	0.1613
3	96.24%	95.85%	0.1336	0.1391
4	96.49%	96.11%	0.1190	0.1368
5	97.50%	96.61%	0.0914	0.1114
6	97.91%	96.69%	0.0844	0.1078
7	98.07%	97.15%	0.0773	0.0999
8	98.36%	97.18%	0.0644	0.0930
9	98.38%	97.15%	0.0583	0.0914
10	98.76%	97.34%	0.0505	0.0855
11	98.68%	97.20%	0.0519	0.0897
12	98.87%	97.38%	0.0471	0.0849
13	98.95%	97.51%	0.0411	0.0807
14	99.09%	97.60%	0.0386	0.0792
15	99.17%	97.56%	0.0357	0.0786
16	99.20%	97.57%	0.0352	0.0798
17	99.28%	97.65%	0.0333	0.0788
18	99.36%	97.64%	0.0303	0.0767
19	99.35%	97.66%	0.0307	0.0782
20	99.40%	97.71%	0.0283	0.0753

Comparision between CNN with normal dataset and CNN with permutated dataset

- The accuracy is slighly lower with the permutated MNIST dataset (98.60% vs 97.71%)

- The loss is slighly lower with the permutated MNIST dataset

- We clearly see that having the dataset permutated for the classification with the CNN is not a problem. Same as before.