Deep Learning in Practice - TP1 Report
Hyperparameters and Training Basics with PyTorch

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1 Multi-Classification Problem

2 Regression Problem

3 Observations and Trade-offs to Consider When Training Deep Learning Models

A Problem 1: Results for Different Hyperparameters

The symbol * indicates the value used in the default configuration.

Impact of the number of layers:

Number of Layers	Train Accuracy (%)	Validation Accuracy (%)	Train Time (s)
1	98.57	96.82	7.91
2*	99.08	97.44	14.52
3	99.22	97.37	18.26
5	97.83	96.90	24.69

Impact of the number of neurons in hidden layers:

Hidden Layer Size	Train Accuracy (%)	Validation Accuracy (%)	Train Time (s)
8	97.72	96.13	11.62
16*	99.08	97.44	14.52
32	99.68	98.14	18.94
64	99.90	98.92	29.29

Impact of the activation function:

Activation Function	Train Accuracy (%)	Validation Accuracy (%)	Train Time (s)
ReLU*	99.08	97.44	14.52
Sigmoid	96.83	94.58	14.28
Tanh	99.72	97.60	14.79
Leaky ReLU	98.77	97.37	14.39

Impact of the batch size:

Batch Size	Train Accuracy (%)	Validation Accuracy (%)	Train Time (s)
16	99.62	98.76	18.74
32	99.05	96.82	15.78
64*	99.08	97.44	14.52
128	98.18	96.59	13.57

Impact of the learning rate:

Learning Rate	Train Accuracy (%)	Validation Accuracy (%)	Train Time (s)
0.001*	99.08	97.44	14.52
0.01	99.43	98.14	14.36
0.1	16.23	17.04	14.21
1	16.23	17.04	14.34

Impact of the number of epochs:

Number of Epochs	Train Accuracy (%)	Validation Accuracy (%)	Train Time (s)
10	97.27	95.82	4.87
30*	99.08	97.44	14.52
50	99.50	97.68	24.05
100	99.50	97.13	47.41

Impact of the optimizer:

Optimizer	Train Accuracy (%)	Validation Accuracy (%)	Train Time (s)
Adam*	99.08	97.44	14.52
RMSprop	99.17	97.29	14.27

Impact of the loss function:

Loss Function	Train Accuracy (%)	Validation Accuracy (%)	Train Time (s)
MSE*	99.08	97.44	14.52
Cross-Entropy	99.05	97.68	14.35

B Problem 2: Results for Different Hyperparameters