

Domáci úkol SSU 2

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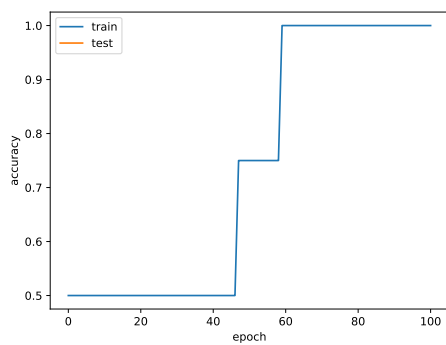
1 Backpropagation

The task was to implement forward and backward messages (deltas) of the layers of the neural network as well as gradient messages for the weights and bias update in the linear layer.

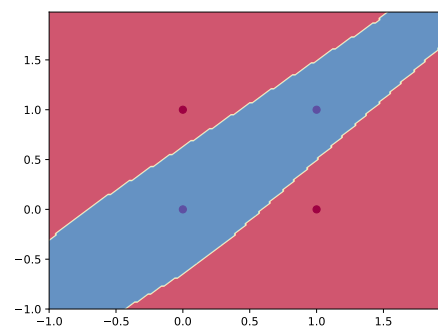
1.1 XOR testing dataset

A simple dataset with 4 combinations of 0 and 1 and results of xor function on them was used to debug the implementation of the neural network.

The resulting accuracy with respect to number of epochs is and the final classification is plotted in the following figures:



(a) Convergence of the training on xor dataset



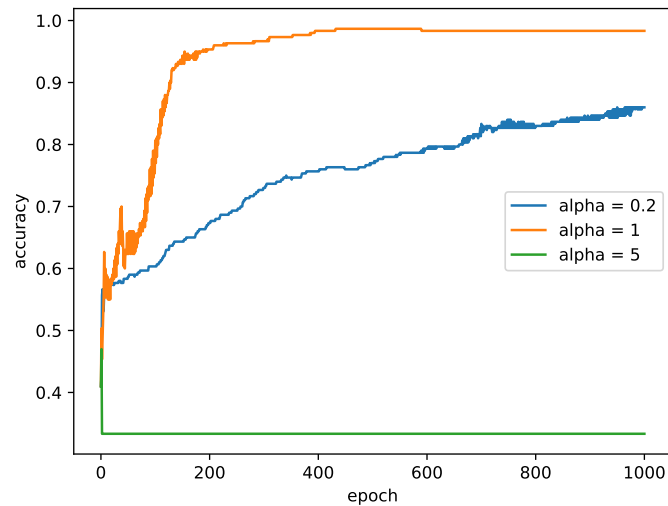
(b) learned classification

1.2 Spirals dataset

The training on the spirals dataset was conducted with three different learning rates (alphas). In the first run ($\alpha = 0.2$), the learning rate was too slow, because it made the values of dW and db , which update the parameters of the linear layer (weights and biases), **too small**.

The second run showed an improvement, because of the bigger alpha value. The update step is now neither too small nor too big.

The third run ($\alpha = 5$) shows the case, when the learning rate is **too big**. This results in fast changes in the parameters so that their values end too far from the optimal ones and will never converge.



Obrázek 2