`http://ml3.leuphana.de/lectures/summer24/DL`
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Exercise 3

Due on: Thursday, 16.05.2024

Task 8 Binary Classification on MNIST

In Task 4 we already considered a binary classification problem on MNIST. In this task we focus on the classification of the digits 6 and 9 and use our neural network implementation.

(i) Train the network and compute the train and test accuracy.

(ii) Implement a function that rotates an image by a given degree. Pick a random training instance showing the digit 9. Rotate this instance with various degrees in $[0, 2\pi]$ and compute the probability of the rotated image being classified as a 9. Depict the result in a figure.

Task 9 Multiclass Classification

Implement the softmax layer and the cross-entropy loss within the `NeuralNetwork` class and train a 10-class classifier on MNIST.

Task 10 PyTorch

(i) Read the classification tutorial from the PyTorch documentation.*

(ii) Adapt the code and implement a 10-class classifier for the MNIST data set based on the tutorial you just read. Use the CrossEntropyLoss and the Adam optimizer.

*`https://pytorch.org/tutorials/beginner/blitz/cifar10_tutorial.html`