



Deep Learning Summer Course - Exercise 3

Summer 2022

Thursday 11-8-2022

To do these exercises, you will use Python with 3 and the following packages:

- [TensorFlow](#). The used backend used for Keras
- [Keras](#). Good front-end package for easier integration of neural networks
- [Matplotlib](#). This package allows you to graph your data.
- [Seaborn](#). This extends Matplotlib with new plots.

You are not strictly forced to use these packages, but it is highly recommended. Feel free to use other packages you think are necessary.

We will go through your results of this exercise on Friday 12-8-2022, so you are expected to have completed them.

Question or comments: [Tobias Greisager Rehfeldt](#)

This exercise will extend on the model created during Exercise 1.

Load the dataset by:

```
from tensorflow.keras.datasets import mnist
from tensorflow.keras.utils import to_categorical
import seaborn as sns
import matplotlib.pyplot as plt
# Loads the data
(train_data, train_labels), (test_data, test_labels) = mnist.load_data()
# Plots a single digit from the data
sns.heatmap(train_data[1, :, :])
plt.show()
# Reshapes the data to work in a FFN
train_data = train_data.reshape((60000, 28*28))
test_data = test_data.reshape((10000, 28*28))
num_classes = 10
train_labels = to_categorical(train_labels, num_classes)
test_labels = to_categorical(test_labels, num_classes)
```

1. Create an identical model, this time adding some regularization, and see if you can increase the accuracy of the model.
2. Try adding dropout between some layer, where do you find this has the highest impact?
3. How does L1 compare to L2 regularization?
4. Vary the number of units, the amount of layers, activation functions, etc. to obtain the best accuracy you can.