MEIC 2020/2021
Aprendizagem - Machine Learning
Homework V
Deadline 04/06/2021
Submit on Fenix

Using Tensorflow/Keras as exemplified in Practical Lecture 9, explore the use of different neural network architectures to achieve the highest performance on the test set of the famous MNIST data set. More specifically, compare the performance of Feed-Forward and Convolutional Neural Networks and assess the impact of changing the following characteristics:

Feed-Forward Neural Networks:

- Number of neurons in the hidden layer
- Activation function of the hidden layer
- Number of hidden layers
- No regularization vs L1/L2 regularization

Convolutional Neural Networks:

- Number of kernels/filters
- Pooling vs No Pooling
- Number of convolutional layers
- Fully connected layer between the convolutional and output layers
- No regularization vs Dropout

You must submit a double-column report with a maximum of 2 pages (excluding tables and figures), including the following information:

- **Working** link to a notebook with the code on Google Colaboratory
- Description of the networks used in the experiments
- Description of the evaluation approach
- Presentation and discussion of the results
- The most important conclusions

NOTE: The evaluation will be based on the report and not on the code. Thus, don't forget to include important information such as the different values covered in your experiments.

You can find additional information regarding how to implement your networks in:

- Practical Lecture 9
- https://www.tensorflow.org/tutorials
- https://colab.research.google.com/github/tensorflow/docs/blob/master/site/en/tutorials/quickstart/beginner.ipynb