

Lab 4
(2h40, evaluated)

Neural Networks
Implementing a Convolutional Neural Network with Keras

Introduction

In this lab, we will see how to build a convolutional neural network with the Keras framework in Python. As usual, we give an incomplete python program. Some instructions will be used as they are and you do not need to change them. We will comment some of them but we do not need to understand them all. We will use the datasets MNIST and CIFAR10.

So first, you need to download the file `lab4_skeleton.py` available at:

http://dept-info.labri.fr/~mansenca/DLCV2018/lab4_skeleton.py

You will need to activate the work environment with:

source /net/ens/DeepLearning/tensorflow/bin/activate

1. Convolutional Neural Network on MNIST dataset

Program your first convolutional neural network to recognize the 10 digits.

1. Complete the file to define a model that use a convolution layer.
2. Train your network and measure its accuracy.
3. Search the best network architecture and hyper-parameters that maximize accuracy

2. Convolutional Neural Network on CIFAR10 dataset

CIFAR10 dataset consists of color images in 10 classes (airplane, automobile, bird, cat, deer, dog, frog, horse, ship, truck). Program a convolutional neural network to recognize the 10 classes.

4. Explore the data set and display some images
5. Complete the file to define a model that use a convolution layer.
6. Train your network and measure its accuracy.
7. Search the best network architecture and hyper-parameters that maximize accuracy

You must send an archive with your code and report.

The report should contain a description of the network architectures and hyper-parameters that you tried, and for each try : the plot of the loss function of the corresponding training, the final accuracy on the test set, and the 10 worst classified images (with the category that you get and the actual category).

This archive must be named `LASTNAME_firstname_Lab4_DLCV.tar.bz2` and send to : boris.mansencal@labri.fr with DLCV in the e-mail subject.