

# Assignment for Image Classification . Computer Vision Course. 2018.

Date due: Friday, Dec 28th, 2018, 23:55.

In this practical exercise you will solve an image classification problem using deep models.

The goals of this assignment are:

- Develop proficiency in using Keras for training neural nets (NNs).
- Put in practice general Machine Learning knowledge to optimize the parameters and architecture of a dense feed-forward neural net (ffNN), in the context of a computer vision problem.
- Use NNs specially conceived for analysing images. Design and optimize the parameters of a Convolutional Neural Net (cNN).
- Improve the performance of a NN by regularizing and processing the data through the net.

## **A) Dense feed forward model**

Design and train a ffNN that solves the classification problem posed in the Cifar-10 data base . As a starting point in this project you can use the model provided in the materials for the course.

You have to improve the results provided in the initial net configuration files. To this end you must decide on:

- Number of layers and number of units in each layer.
- Optimization algorithm and parameters to train the network
- Check the evolution of these parameters during the optimization and decide when to stop training.

## **B) Convolutional model**

Here we experiment with cNNs, a special type of NN conceived for analysing images. Use cNNs to design a new model that beats previous classification results obtained on the Cifar10 data set.

## **C) Performance improvement**

Improve the performance of your NNs by regularizing and pre-processing the data through the net. Use any combination regularization or data processing procedures to improve the performance of your ffNN and cNN.

## **D) Report**

Write a report describing

- the problem (briefly);
- final network architectures and final performance (accuracy and loss) obtained with all four models (ffNN, ffNN+improvement, cNN, cNN+improvement) on the train and test data sets;
- plots of the evolution of costs and classification performance on both data sets for each architecture;
- the process that you have followed to reach your final solution;
- discuss your results.

In your report you may also comment on other experiments that you have made during this project related to other aspects of Deep Learning discussed in class. It would also be very valuable your feedback on the use of *Google Cloud* and *Google Colab* services.

There are two new Wiki pages “Mejor resultado ffNN” and “Mejor resultado cNN” where you must include you best results for the final dense and convolutional models.

**Your final report and wiki results** should be submitted by Friday, **December 28th, 23:55.**

In your submission include the Jupyter Notebook source file and the pdf version.