

# Assignment for unit 3: Computer Vision

In this practical exercise you will solve several computer vision problems using deep models.

The goals of these assignments are:

- Develop proficiency in using Keras for training and testing neural nets (NNs).
- Optimize the parameters and architecture of a feed-forward neural network (ffNN), in the context of a computer vision problem.
- Design a convolutional net (CNN) for traffic sign image classification.
- Build a traffic sign detection algorithm.

**Warning:** This is not the final wording for the assignment. We will include more work each week. Although the submission date for the final report is still way ahead, we strongly recommend that you complete each week the proposed homework and submit your slides and results in due time.

## Practical Assignment

### 1. Week March, 20<sup>th</sup> to 27<sup>th</sup>.

Follow the instructions in your class slides to set up your working environment.

This week we will put into practice knowledge to optimize the parameters and architecture of a ffNN for solving an image classification problem.

Download from Moodle the Jupyter notebook `Assignment_3_1.ipynb` and run all cells to set up the traffic sign data set.

You must modify the code in section “**Assignment 1**” to improve the ffNN that solves the traffic sign classification problem. To this end you must decide on:

- Number of layers and number of units in each layer.
- Optimization parameters to train the net.
- When to stop training according to the evolution of training during the optimization.

Note that at this point that you are not allowed to use Convolutional Neural layers.

You must produce a few **slides** in PDF format describing the problem, the network architecture, the performance obtained with your model on the train and test data sets, plots of the evolution of costs and classification performance on training and test data sets. Describe also the process that you have followed to reach your solution.

During the course of this assignment you should introduce your intermediate test results in the wiki contest page “**The ffNN challenge 2019**” located in the Moodle page.

Submit your pdf slides and Python code to “**The ffNN assignment 2019**” delivery area before the deadline.

Deadline: Monday, March 25th, 23:55.

### 2. Week March, 27<sup>th</sup> to april 1<sup>st</sup>.

This week we will improve our previous net using convolutional layers.

Download from Moodle the Jupyter notebook `Assignment_3_2.ipynb`. Improve the performance of your net compared to that of the previous week. Again, you must decide on:

- Architecture of your net
- Performance improvement (regularization, data augmentation, etc.)
- Weights optimization.
- Etc...

Note that at this point that you are not allowed to use tranfer learning. You have to train

your net from scratch.

You must produce a few **slides** in PDF format describing the network architecture, the performance obtained with your model on the train and test data sets, plots of the evolution of costs and classification performance on training, validation and test data sets. Describe also the process that you have followed to reach your solution.

During the course of this assignment you should introduce your intermediate test results in the wiki contest page "**The CNN challenge 2019**" located in the Moodle page.

Submit your pdf slides and Python code to "**The CNN assignment 2019**" delivery area before the deadline.

Deadline: Monday, April 1st, 23:55.