Laboratory on Neural Networks

TensorFlow

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Jupyter

Download and extract the TensorFlow lecture material from:

`http://disi.unitn.it/~passerini/teaching/2018-2019/MachineLearning/`

Open the terminal in the folder containing the extracted archive and run:

```
$> ./jupyter-tensorflow.sh
```

Make sure you are using Python 3 for the following steps.

Install Numpy, Scipy, Matplotlib, TensorFlow and Jupyter:

```
$> pip install numpy scipy matplotlib tensorflow jupyter
```
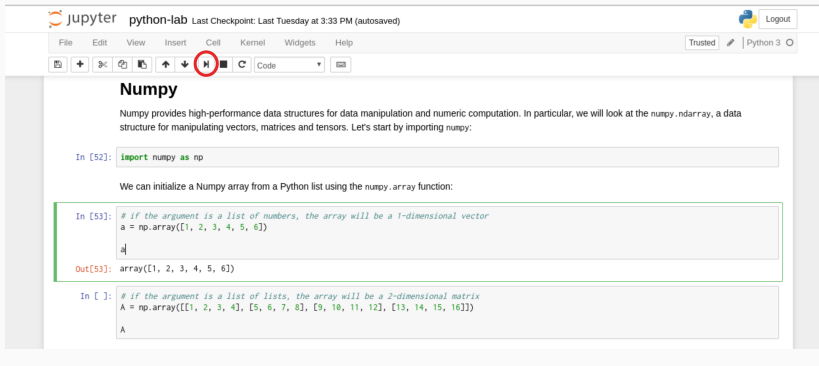
(you may want to install CUDA and tensorflow-gpu if you have a dedicated GPU)

Download and extract the material for the TensorFlow lab.

Open the terminal in the folder containing the extracted archive and run:

```
$> jupyter notebook
```

Execute commands by selecting a cell and clicking the Run button on the header of the page or by **Shift+Enter**. You will see the output of the command just below the cell.

You can tweak and modify the code as you wish and execute it again.

For the third Machine Learning assignment you will solve a classification task using **TensorFlow** over the OCR dataset. The dataset is already split into training and test sets. Your task is to train a deep neural network on the training set and predict the labels on the test set. To pass the assignment, your network has to classify the examples in the test set with higher accuracy than the reference baseline for the dataset.

Additionally, you need to test your algorithm via cross-validation over the training set and produce a report containing the results obtained.

Download the assignment material:

http://disi.unitn.it/~passerini/teaching/2018-2019/MachineLearning/

The material motains:

- The training set examples;
- The training set labels;
- The test set examples;
- The test set labels;
- A README containing info about the dataset.
  this file also contains the reference baseline accuracy;

Assignment — Step-by-step

1. Experiment with a deep network architecture of your choosing;
2. Test your network using cross-validation over the training set;
3. Train your classifier over the full training set;
4. Use the classifier to predict the examples in the test set;
5. Place the labels in a file, in the same order as you read the test examples and in the same format of the labels in the training set.
6. Write a report describing the learning algorithm used and discussing the results obtained; The report should contain at least:
   - The average accuracy over the folds and over the test set.
   - A simple diagram of the network architecture (use Google Drawings or similar software);

- After completing the assignment submit it via email
- Send an email to mllab@unitn.it
- Subject: tensorflowSubmit2018
- Attachment: id_name_surname.zip containing:
  - The text file containing the final predictions;
  - The code used to produce the predictions;
  - The report in PDF format.

NOTE

- **No group work**
- This assignment is mandatory in order to enroll to the oral exam