

Machine Learning

Efrei - Paris
Big Data & Machine Learning
M1

2020/2021

Artificial Neural Networks

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Neural Networks lab

Dataset:

The dataset (on moodle) consists of 5000 images of 400 pixels in gray scale ranging from -1 to 1. The labels represent 0 to 9. In the label.txt, you will find '10' instead of zero. You have to replace it hence.

Lab description:

You have to Implement, from-scratch, an image classifier using the feed-forward neural network (FFNN). You have to optimize the FFNN parameters by repeating until convergence the forward propagation and back propagation.

In order to realize your objective you have to:

- Separate the dataset in two parts: training and test datasets.
- Implement the feed-forward neural network (FFNN) by learning using the training dataset. This FFNN should consist of 3 layers.
- Choose the number of hidden neurons that suits the best for the problem.
- Optimize the FFNN parameters by repeating until convergence the forward propagation and back propagation.
- Test your classifier with the test dataset.
- Evaluate the performance of your algorithm. For this purpose you shall implement confusion matrix.
- Generalize your model to any number of layers and any number of nodes per layer.
- Compare the obtained results when the number of layers increases (for the same number of nodes)

Deliverables and organization:

- ❖ You can work on any Python environment
- ❖ Please work in **pairs**! Each group (composed of 2 persons at most) shall submit one report. Otherwise (if you are more than 2) a penalty of 5 points will be applied
- ❖ Do not forget to indicate your names in the report.
- ❖ The same groups shall be maintained for the three labs.
- ❖ The final report shall be uploaded on the Moodle's page before **Wednesday 06/1/2021 at 23:55**
- ❖ The presentations will take place on **Friday 8th of January.**

Presentations:

In the presentation day, you shall prepare **10 minutes pitch**, in which you present the results of the 3 labs (linear regression, logistic regression, neural networks). You have to especially justify your choices and compare the results you obtained with those obtained with Scikit Learn or other libraries.

Final deliverable

The final deliverable shall contain the code, results, explanations and necessary screenshots:

- A report generated from your notebook (format PDF or html).
- The notebook itself (format ipynb)

The 2 files shall be zipped into one and uploaded on the MOODLE page.