French name transcription from handwriting using ANNs

1 Description

Handwritten text identification from images is one the most common application domains of ML algorithms [1, 2]. Perhaps the best known dataset used for evaluating classifiers is the The MNIST Database of Handwritten Digits `yann.lecun.com/exdb/mnist/`. However, more complex datasets of handwritten text have been introduced.

2 Objectives

The goal of the project is to solve the task of name transcription from handwritting images implementing a NN approach and using a database with a large number of images of handwritten names[1].

The goal of the project is the application Neural Networks for: I) Find suitable feature representations for this problem that are very usable for other ML classifiers, OR, II) Implement NN-based classifiers for this problem, OR III) The combination of I and II (e.g., using an RBM to find the features and a Multi-layer Perceptron to classify the problem using the extracted features). In case II), the students are free to decide which feature representation is more appropriate for the data. In case I), they can use any classifier with the NN-based features. The student should: 1) Propose the representation and/or classifier. 2) Implement the solution of the classification problem. 3) Evaluate and discuss the results of the classifier. 4) Answer to the following questions in the report:

- What class of problems can be solved with the NN? (e.g., supervised vs unsupervised problems)
- What is the network architecture? (e.g., type and number of layers, parameters, connectivity, etc.).
- What is the rationale behind the conception of the NN?
- How is inference implemented? (e.g., How is the information extracted from the network?). Type of prediction or type of inference process.
- What are the learning methods used to learn the network ? Algorithms used for learning the network.

As in other projects, a report should describe the characteristics of the design, implementation, and results. A Jupyter notebook should include calls to the implemented function that illustrate the way it works.

3 Suggestions

- Read previous approaches to handwriting transcription using ANNs.
- Implementations can use any Python library.

[1]The Database "Transcriptions of names from handwriting" can be downloaded from `https://www.crowdflower.com/data-for-everyone/`.

- If you decide to train a new architecture using the data, provide the trained network for the project revision process. This network can be loaded and invoked from the python notebook.
- Visualization of the features learned by the network is encouraged as an additional step after classification.

References

[1] Dan Claudiu Cireşan, Ueli Meier, Luca Maria Gambardella, and Jürgen Schmidhuber. Deep, big, simple neural nets for handwritten digit recognition. *Neural computation*, 22(12):3207–3220, 2010.

[2] Geoffrey E Hinton, Simon Osindero, and Yee-Whye Teh. A fast learning algorithm for deep belief nets. *Neural computation*, 18(7):1527–1554, 2006.