Assignment 3, Literature draft

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Problem definition

Modelling fonts with convolutional neural networks

The goal of the project is to find relations between characters of different types of writing systems (scripts). In the first part of the research a deep convolutional neural network will be trained to classify (images of) characters. A deep convolutional neural network is a machine learning architecture consisting of (multiple) stacks of layers. Depending on the availability of (training)data the training/learning process can either be supervised, using phonemes to label characters or unsupervised, using just the characters. The second part of the project will focus on getting a better understanding of the representations learned by the network. This will mainly be done by investigating and visualizing features learned in individual layers and smaller combinations of layers. The results can be compared to existing image recognition networks or between methods (for example if supervised and unsupervised are both used).
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Literature

ImageNet Classification with Deep Convolutional Neural Networks[4]

This article is cited a lot in image recognition research.

Convolutional neural network committees for handwritten character classification[2]

Feature extraction with convolutional neural networks for handwritten word recognition[1]

Human-level concept learning through probabilistic program induction[5]

A self-organized artificial neural network architecture for sensory integration with applications to letter-phoneme integration[3]

References

[1] Théodore Bluche, Hermann Ney, and Christopher Kermorvant. Feature extraction with convolutional neural networks for handwritten word recognition. In *Document Analysis and Recognition (ICDAR), 2013 12th International Conference on*, pages 285–289. IEEE, 2013.

[2] Dan Claudiu Ciresan, Ueli Meier, Luca Maria Gambardella, and Jurgen Schmidhuber. Convolutional neural network committees for handwritten character classification. In *Document Analysis and Recognition (ICDAR), 2011 International Conference on*, pages 1135–1139. IEEE, 2011.

[3] Tamas Jantvik, Lennart Gustafsson, and Andrew P Papliński. A self-organized artificial neural network architecture for sensory integration with applications to letter-phoneme integration. *Neural computation*, 23(8):2101–2139, 2011.

[4] Alex Krizhevsky, Ilya Sutskever, and Geoffrey E Hinton. Imagenet classification with deep convolutional neural networks. In *Advances in neural information processing systems*, pages 1097–1105, 2012.

[5] Brenden M Lake, Ruslan Salakhutdinov, and Joshua B Tenenbaum. Human-level concept learning through probabilistic program induction. *Science*, 350(6266):1332–1338, 2015.