

Bachelor Thesis overview

# **On the biological plausibility of modern deep learning.**

*or*

## **Is deep learning to airplanes what the brain is to birds?**

In the recent years, deep learning has resurrected from the AI winter in the 1980s and shown impressive results due to the availability of massive parallel compute and huge amounts of data. From the biological inspiration of the neuron to the perceptron where data inputs are weighted, summed together and thresholded, several new modern architectures, like recurrent, residual and transformer neural networks have pushed the limits and achieved state of the art results in speech recognition, computer vision and natural language understanding.

In this bachelor project I will examine and compare the existing literature on the biological plausibility of modern deep learning. Despite of being originally inspired by the human brain, the real number valued inter-neuron signals along with the backpropagation algorithm for updating the weights, has been criticized for being biological implausible. This thesis will compare backpropagation to other biologically constrained learning algorithms and make connections to the learning process in the brain. Is there some fundamental learning rule for intelligence, independent of the implementation? And is deep learning an instance of that? Formulated analogously; is deep learning to airplanes what the brain is to birds?