

# Jannik Thümmel

## EDUCATION

**Technische Universität Berlin, Berlin** —  
*M.Sc. Computational Neuroscience*

October 2016 - March 2021

Focus subjects:

- Projects in Artificial Intelligence and Machine Learning

**University of Aberdeen, Aberdeen (Scotland)** —  
*Erasmus Semester*

September 2015 - December 2015

**University of Osnabrück, Osnabrück** —  
*B.Sc. Cognitive Science*

October 2012 - September 2016

Focus subjects:

- Artificial Intelligence
- Neuroinformatics
- Philosophy of Mind
- Mathematics
- Cognitive Neuropsychology

**Rhein-Maas-Gymnasium, Aachen** — *Abitur*

August 2003 - June 2012

## SKILLS

Python

Tensorflow

PyTorch

Matlab

LaTeX

OpenCV

## LANGUAGES

English

German (Native)

## PROJECTS

### **Fixed-points of linear Stein Variational Gradient Descent** (Prof. Dr. Manfred Opper) — *November 2020 - February 2021*

Compared the fixed-point behaviour of two particle-based Variational Inference methods for high-dimensional Gaussians. Work included simulations and theoretical analysis. Implementation in PyTorch.

### **Inferring network topology from complex contagion dynamics**

(Dr. Pawel Romanczuk) — *November 2019 - July 2020*  
(Master's Thesis)

Developed two approaches to infer the topology of behavioural networks from observations of the dynamics of a complex contagion process on the networks:

Generated synthetic data of behavioural contagion using a simulation of a spatial network of agents approximated by leaky integrate-and-fire neurons.

Inferred patterns of local connectivity with a logistic regression model fit to predict the activity of individual nodes.

Classified the activity of the system from a global view of the network using a hand-designed convolutional neural network. Implementation in PyTorch.

### **Applying a Stein Variational Auto-Encoder to medical images**

(Prof. Dr. Kerstin Ritter) — *February 2019 - May 2019*

Implemented a convolutional Variational Auto-Encoder trained with Stein Variational Gradient Descent to classify sMRI images. Initial implementation in Tensorflow, final implementation in PyTorch.

### **Propagation speed of startle waves in fish schools**

(Dr. Pawel Romanczuk) — *September 2018 - November 2018*

Implemented an analysis pipeline to extract the propagation speed of a startle wave from field recordings. Used NumPy and OpenCV.

### **R-CNN for lymphocyte classification**

(Prof. Dr. Klaus-Robert Müller) — *February 2018 - May 2018*

Worked on transferring a region based CNN model to identify and locate lymphocytes in images of biopsy slices. Implementation was done in Keras/Tensorflow.

### **Two models for a one-dimensional categorization task**

(Prof. Dr. Frank Jäkel) — *April 2016 - September 2016 (Bachelor's Thesis)*

Implemented two models for threshold learning in signal detection tasks and applied them to behavioural data from animal experiments. Work was done using Matlab.