Katja Seeliger *Curriculum Vitae (academic)*

Contact

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Academic positions and education

Max Planck Institute for Human Cognitive and Brain Sciences *March 2020 to present*

Postdoctoral researcher in the *Vision and Computational Cognition Group* led by Martin Hebart. Convolutional neural networks and vision neuroscience. Synthesizing preferred stimuli of individual brain areas.

Donders Institute for Brain, Cognition and Behaviour *October 2015 to December 2019*

Ph.D. student in the Artificial Cognitive Systems Lab, supervised by Marcel A. J. van Gerven. Studying how representations learned by convolutional neural networks relate to human sensory processing. Recording of the largest audiovisual functional MRI data set in a human ever with the aim of training these modern neural network representations directly on brain activity. Further work on reconstruction from their brain activity what somebody perceives.

Technische & Humboldt-Universität Berlin / BCCN Berlin
September 2012 to September 2015

Master of Science in Computational Neuroscience. Next to the thesis project, the degree included three lab rotations and a seminar project. (final grade: 1.4)

- *Thesis*: Neural encoding for video stimuli with unsupervised hierarchical representation learning. Supervised by Machine Learning Group at TU Berlin. (grade: 1.0)
- *Lab rotation 3*: Hierarchical video feature learning for an encoding model for video stimuli (fMRI) in the group of Shinji Nishimoto (4/2014 - 6/2014, CiNet, Osaka, Japan).
- *Lab rotation 2*: Extending a network editor for analysing robustness in boolean networks in the group of Nihat Ay (2/2014 - 3/2014, MPI-MIS, Leipzig).
- *Lab rotation 1*: Conducting an fMRI pilot experiment aimed at reconstructing spatiotemporal visual perception in Haynes lab (11/2013 - 1/2014, BCCN).
- *Seminar project*: Auditory Brain-Computer-Interfaces: Detecting spatial auditory attention in cocktail-party situations. (summer term 2013, BBCI group).

Bauhaus-Universität Weimar *April 2008 to April 2012*

Bachelor of Science in Computer Science and Media / Media Systems (final grade: 1.3)

- *Thesis*: Usability of P300-spelling and asynchronous input for text input systems on the Emotiv consumer EEG. Supervised by Günther Schatter. Evaluation of affordable text input methods for locked-in patients. (grade: 1.3, written: 1.0)
- *Additional lab rotation*: Visualizing a cellular automaton for sand dune dynamics on a multitile display. (9/2010 - 4/2011, Large-Scale Computational Science Division, Osaka University, Japan).
- *Lab rotation 2*: Setting up a multi-touch display on a sea-container for Bauhaus Summæry.
- *Lab rotation 1*: Predicting ⋆ featured articles in the Wikipedia – engineering features for detecting information quality (using Weka).

Bauhaus-Universität Weimar *October 2007 to September 2008*

Studies towards a Bachelor of Arts in Media Culture.

Albert-Schweitzer-Gymnasium, Bad Düben *September 1998 to June 2006*

Abitur with focus courses in Mathematics / Physics (final grade: 1.4)

Professional

DLR Institute of Planetary Research, Berlin-Adlershof
March 2013 to March 2014, September 2014 to August 2015

Student employment at the section for Asteroids and Comets: Assistance within machine learning-based visual smoke detection in the FireWatch project, preparation of particle simulations on the HLRN for comet visualizations for the Rosetta mission, control wrapper for the

pco.edge sCMOS camera (Python), developing a metadatabase and a GUI interface for the Rosetta OSIRIS / VIRTIS / NavCam data (Python).

Professional

Datameer Inc., San Mateo, CA (US) *May 2012 to August 2012*

Research & Development intern in the San Francisco Bay Area office: Prototyping and implementing (Python, Java, Hadoop) a MapReduce machine learning model for the Datameer business intelligence software, performance optimization. The implementation could largely be transferred into the fall 2013 release. The internship was financially supported by the GIZ.

Chair of Web Technology and Information Systems, Bauhaus-Universität Weimar
June to September 2010, April 2011 to August 2012

Student employment: Information retrieval on the Wikipedia corpus: Tasks in research for automatic detection of information quality ($\star$ featured articles, cleanup templates); analyses and processing of the revision history data using Hadoop MapReduce. This work was included within the InnoProfile project *Intelligent Learning*.

Chair of Building Physics, Bauhaus-Universität Weimar *August 2009 to April 2010*

Student employment: Researching background in learning theory, prototyping of a building physics eLearning serious game within the project *Intelligent Learning*.

first site locations, Hamburg (GER) *July to September 2007*

Location scout intern: Documenting and offering locations for advertisement productions.

Rockstar Games Lincoln, Lincoln (UK) *July 2006 to June 2007*

Localisation Tester: Proofreading translations and participating in the quality assurance and design evaluation process of Rockstar Games.

Information technology

Programming Languages

- Professional or student project experience with Python, Java, MATLAB, C++.
- Encountered Ada, C#, R, SQL, XML / HTML in assignments or small projects.

Software Frameworks and Applications

- Professional or student project experience with scientific Python (e.g. chainer, pytorch, numpy, matplotlib), Hadoop MapReduce, Psychophysics Toolbox, FieldTrip.
- Familiar with VCS (CVS, git, SVN), Weka, JIRA, SQLite, LaTeX.

Publications

K. Seeliger, L. Ambrogioni, Y. Güçlütürk, U. Güçlü, M. A. J. van Gerven (2019): *End-to-end neural system identification with neural information flow (in preparation at PLoS Computational Biology, preprint)*

K. Seeliger, R. P. Sommers, U. Güçlü, S. E. Bosch, M. A. J. van Gerven (2018): *A large single-participant fMRI dataset for probing brain responses to naturalistic stimuli in space and time. (in review)*

K. Seeliger, U. Güçlü., L. Ambrogioni, Y. Güçlütürk, M. A. J. van Gerven (2018). *Generative adversarial networks for reconstructing natural images from brain activity*. NeuroImage. *(preprint)*

K. Seeliger, M. Fritsche, U. Güçlü, S. Schoenmakers, J.-M. Schoffelen, S. E. Bosch, M. A. J. van Gerven (2017): *Convolutional neural network-based encoding and decoding of visual object recognition in space and time*. NeuroImage. *(preprint)*

S. E. Bosch, K. Seeliger, M. A. J. van Gerven (2016): *Modeling Cognitive Processes with Neural Reinforcement Learning*. bioRxiv preprint.

All co-authored research work is listed on my GoogleScholar profile.

Talks and seminars

Deep learning in computational neuroscience workshop at Bernstein Conference 2019. Talk: *End-to-end learning of neural information processing systems from brain data*.

Big data in vision science symposium at European Conference on Visual Perception (ECVP) 2019. Talk: *A large single-participant fMRI dataset for probing brain responses to naturalistic stimuli in space and time*.

Schloss Dagstuhl Seminar on Human-Like Neural-Symbolic Computing (2017). Talk: *Neural network representations and visual processing in brains*.

2017 OIST Computational Neuroscience Course (OCNC), Okinawa, Japan. Fully-funded summer school on computational neuroscience (attended).

Conference / Workshop posters

J. Roth, K. Seeliger, T. Schmid, M. N. Hebart (2021): *Synthesizing Preferred Stimuli for Individual Voxels in the Human Visual System*. Computational and Systems Neuroscience (Cosyne) 2021.

J. Singer, K. Seeliger, M. N. Hebart (2020): *The representation of object drawings and sketches in deep convolutional neural networks*. NeurIPS 2020 workshop on Shared Visual Representations in Human & Machine Intelligence.

K. Seeliger, L. Ambrogioni, U. Güçlü, M. A. J. van Gerven (2019): *Neural Information Flow: Learning neural information processing systems from brain activity*. Conference on Cognitive Computational Neuroscience (CCN) 2019.

K. Seeliger, M. Fritsche, U. Güçlü, S. Schoenmakers, J.-M. Schoffelen, S. E. Bosch and M. A. J. van Gerven: *A forward pass through the visual system: ConvNets encode MEG source activity*. NeurIPS workshop MLINI, December 2016, Barcelona.

K. Seeliger, G. Montavon, K.-R. Müller, M. A. J. van Gerven, S. Nishimoto: *Hierarchical K-means encodes human visual cortex activity on video stimuli*. NeurIPS workshop MLINI, December 2016, Barcelona.

S. E. Bosch, K. Seeliger, M. A. J. van Gerven: *Modeling human probabilistic categorization with neural reinforcement learning*. NeurIPS workshop Brains+Bits, December 2016, Barcelona.

K. Seeliger, M. Fritsche, U. Güçlü, S. Bosch, S. Schoenmakers and M. A. J. van Gerven: *Convolutional neural networks code for spatiotemporal MEG source activity across the visual system.* ICT.OPEN2016, March 22-23 2016, Amersfoort, The Netherlands.

M. Tangermann, K. Seeliger, A. Nolte, J. Schumacher, P. Zhutovsky, B. Blankertz: *Detecting spatial auditory attention in cocktail-party situations*. Abstracts of the 30th International Congress of Clinical Neurophysiology (ICCN) of the IFCN, March 20-23 2014, Berlin.

Other

Teaching and other university duties

- 2016-2018: Artificial Neural Networks (AI B.Sc.) (preparing / assisting / grading assignments and final exam)
- 2017-2018: Python for Artificial Intelligence (AI B.Sc.) (assistance / grading in practicals)
- 2017-2018: Software management and user support for the DCC cluster
- 2017: Academic and Professional Skills (AI B.Sc.) (grading essays)
- 2016: Computational Modeling and Cognitive Development (Amsterdam Brain and Cognition Summer School) (prepared and taught one-week practical)
- Main supervisor for 5 master students, secondary for 5