

Research

One of the most elusive aspects of intelligence is the ability for robust inference going far beyond one’s experience. Information theory sheds some light on this problem. In particular, lossy compression objectives lead to the emergence of complex behavioral abstractions that allow extracting abstract knowledge which can be transferred to novel situations for rapid adaptation through inductive bias. Find more about my research on inversetemperature.net/research.

Key topics

Structure learning

Phrasing robust inference and decision-making as lossy compression problems [3,4,5].

Emergence

Information-theoretic optimality principles lead to complex behavioral abstractions [2,3].

Bayesian DL

Principled reasoning with deep neural networks. Also the basis for efficient network compression.

Career

Research Scientist: Bosch Center for Artificial Intelligence

Deep Learning Perception group since 07/2016

Joined newly established center in 02/2017
Until 02/2017: research scientist at Cognitive Systems group @ Bosch corporate research.
Topics: Bayesian deep learning, neural network compression, deep learning for vision

PhD: Computational Neuroscience

Max Planck Institute for Intelligent Systems, Tübingen 01/2012-06/2016

Co-affiliation with Max Planck Institute for Biological Cybernetics, Tübingen
Supervisor: Daniel A. Braun (sensorimotor learning and decision-making group)
Topic: Structure Learning with Hierarchical Models for Computational Motor Control
Grade: summa cum laude (with highest honor)

MSc, BSc: Telematics

Graz University of Technology, graduated with distinction 2006-2012

Focus on: Computational Intelligence and Autonomous Robots.
MSc Thesis: Structure learning for robotic motor control (supervisors: Wolfgang Maass, Gerhard Neumann)

Skills

areas	practical	languages
Machine learning	Probabilistic inference	Python (keras)
Information theory	Hierarchical Bayesian modeling	Julia
Bayesian deep learning	Neural Network compression	Matlab
Sensorimotor learning	Computer vision	C#
Robotics	Embedded systems	C/C++

Experience

NTE Systems

Software developer (part-time) 11/2009-03/2011

ZigBee-to-web communication for smart home automation controller (SOAP, .NET Micro framework)

IVM Engineering

Junior consultant, software developer (part-time) 08/2008-10/2009

Encapsulation of CAN-bus communication module (high-level back-end in .NET)

SELECTED PUBLICATIONS

[1] Metzén, Genewein, Fischer, Bischoff (2017) *On Detecting Adversarial Perturbations*. ICLR 2017
 [2] Grau-Moya, Leibfried, Genewein, Braun (2016) *Planning with Information-Processing Constraints and Model Uncertainty in Markov Decision Processes*. ECML 2016
 [3] Genewein, Leibfried, Grau-Moya, Braun (2015) *Bounded rationality, abstraction and hierarchical decision-making: an information-theoretic optimality principle*. Frontiers in Robotics and AI
 [4] Genewein, Hez, Razzaghpahan, Braun (2015) *Structure Learning in Bayesian Sensorimotor Integration*. PLoS Computational Biology
 [5] Genewein, Braun (2104) *Occam’s Razor in sensorimotor learning*. Proceedings of the Royal Society B

For a complete list see inversetemperature.net/publications