Tim Genewein

INVERSETEMPERATURE.NET
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PHD STUDENT
MAX PLANCK INSTITUTE FOR INTELLIGENT SYSTEMS
MAX PLANCK INSTITUTE FOR BIOLOGICAL CYBERNETICS

Research

Bounded rationality: optimal decision-making under limited information processing resources. I am working on an information theoretic optimality principle for bounded rational inference and decision-making that leads to the formation of natural **hierarchies of abstraction**. Closely related topics are structure learning and model selection of which I have tested theoretical aspects in sensorimotor paradigms in virtual reality experiments. Find more about my research on inversetemperature.net/research.

Key topics

Hierarchies of abstraction[1,4]

Information theoretic optimality principle that leads to the formation of hierarchies of abstraction.

Structure learning [2]

Humans extract statistical invariants to enhance their performance. Behavior can be modelled with a hierarchical Bayesian model.

Model selection [3,5]

Humans select among learned structures in a way that is quantitatively consistent with Bayesian model selection.

Education

PhD: Computational Neuroscience

Max Planck Institute for Intelligent Systems
Max Planck Institute for Biological Cybernetics **since 2012**

Topic: Stucture learning through hierarchies of abstraction (supervised by: Daniel A. Braun)

MSc, BSc: Telematics

Graz University of Technology, completed with distinction **2006-2012**

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

Skills

knowledge	practical	languages
Information theory	Probabilistic inference	Julia
Machine learning	Hieararchical Bayesian modelling	Python
Sensorimotor learning	Neural networks	Matlab
Decision theory	Computer vision	C#
Robotics	Embedded systems	C/C++

Experience

NTE Systems

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

Encapsulation of Zig-Bee communication (SOAP) for a smart home automation controller
Web-service implementation on micro-controller platform (SOAP, .NET Micro Framework)

IVM Engineering

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

Encapsulation of CAN-bus communication module (high-level backend in .NET)
Applicability of aspect-oriented programming in a commercial software project

SELECTED PUBLICATIONS

[1] Genewein, Leibfried, Grau-Moya, Braun (2015) *Bounded rationality, abstraction and hierarchical decision-making: an information-theoretic optimality principle*. Frontiers in Robotics and AI
[2] Genewein, Hez, Razzaghpanah, Braun (2015) *Structure Learning in Bayesian Sensorimotor Integration*. PLoS Computational Biology
[3] Genewein, Braun (2104) *Occam's Razor in sensorimotor learning*. Proceedings of the Royal Societey B
[4] Genewein, Braun (2013) *Abstraction in Decision-Makers with Limited Information Processing Capabilities*, NIPS 2013 workshop on Planning with Information Constraints. arXiv
[5] Genewein, Braun (2012) *A sensorimotor paradigm for Bayesian model selection*. Frontiers in Human Neuroscience

For a complete list (including posters and talks) see inversetemperature.net/publications