Imanol Schlag

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CONTACT INFORMATION

IDSIA: The Swiss AI Lab
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RESEARCH INTERESTS

Machine Learning and Connectionist Models for Artificial Intelligence
My work focuses on connectionist models that generalise more systematically due to structured and compositional representations. Recently, I began to investigate *symbol representations* learned from data and the symbiosis of classic algorithms with connectionist components to improve their productivity and performance for out-of-distribution settings.

CURRENT ACADEMIC APPOINTMENTS

Doctoral Assistant, IDSIA - The Swiss AI Lab — **September 2016 to present**
Istituto Dalle Molle di Studi sull'Intelligenza Artificiale
Università della Svizzera italiana
Faculty of Informatics

EDUCATION

Università della Svizzera italiana, Lugano, Switzerland
PhD, Artificial Intelligence and Machine Learning, candidate

- Adviser: Professor Jürgen Schmidhuber
- Area of Study: Artificial Intelligence and Machine Learning

University of St Andrews, St Andrews, Scotland
MSc, Artificial Intelligence, August 2016

- With Distinction
- Thesis Topic: *Face Recognition from Ancient Roman Coins*
- Adviser: Professor Ognjen Arandjelović

University of Applied Sciences and Arts Northwestern Switzerland, Brugg, Switzerland
BSc, Computer Science, August 2015

- With specialisation in *Information Processing and Visualization*
- Thesis Topic: *Face Similarity - Finding Lookalikes from Images*

Swiss Armed Forces Special Forces Training Center, Isone, Switzerland

- Basic Training, 2010
- Non-commissioned Officer School, 2011

PUBLICATIONS

I. Schlag, J. Schmidhuber. Augmenting Classic Algorithms with Neural Components for Strong Generalisation on Ambiguous and High-Dimensional Data. Advances in Programming Languages and Neurosymbolic Systems Workshop (NeurIPS), 2021.

K. Irie, **I. Schlag**, R. Csordás, J. Schmidhuber. A Modern Self-Referential Weight Matrix That Learns to Modify Itself. Deep RL Workshop (NeurIPS), 2021.

K. Irie, **I. Schlag**, R. Csordás, J. Schmidhuber. Improving Baselines in the Wild. Workshop on Distribution Shifts: Connecting Methods and Applications (NeurIPS), 2021.

K. Irie*, **I. Schlag***, R. Csordás, J. Schmidhuber. Going Beyond Linear Transformers With Recurrent Fast Weight Programmers. Neural Information Processing Systems (NeurIPS), 2021.

I. Schlag*, K. Irie*, J. Schmidhuber. Linear Transformers are Secretly Fast Weight Programmers. In Proc. Int. Conf. on Machine Learning (ICML), 2021.

I. Schlag, T. Munkhdalai, J. Schmidhuber. Learning Associative Inference Using Fast Weight Memory. In Int. Conf. on Learning Representations (ICLR), 2021.

I. Schlag, P. Smolensky, R. Fernandez, N. Jojic, J. Schmidhuber, J. Gao. Enhancing the Transformer With Explicit Relational Encoding for Math Problem Solving. Preprint arXiv:1910.06611, 2019.

I. Schlag and J. Schmidhuber. Learning to Reason with Third-Order Tensor Products. Neural Information Processing Systems (NeurIPS), 2018.

I. Schlag and J. Schmidhuber. Gated Fast Weights for On-The-Fly Neural Program Generation. Workshop on Meta-Learning (NeurIPS), 2017.

I. Schlag and O. Arandjelovic. Ancient Roman Coin Recognition in the Wild Using Deep Learning Based Recognition of Artistically Depicted Face Profiles. In Proc. IEEE Conference on Computer Vision and Pattern Recognition, 2017.

Teaching Experience

Università della Svizzera italiana, Lugano, Switzerland

Teaching assistant **2017 to 2021**

- Machine Learning Fall 17/18
- Deep Learning Lab Fall 17/18, Fall 18/19, Fall 19/20
- Graph Deep Learning Spring 20/21

Course development

- Assisted the development of the first version of the Deep Learning Lab for Fall 17/18

Swiss Armed Forces, Grenadier-Battalion 30/2, Isone, Switzerland

Military instructor and squad leader **2012 to 2019**

- Yearly 4 week repetition course

Professional Experience

Google X, Mountain View, California, USA

Research internship with Behnam Neyshabur (remote) **September to February 2022**

Microsoft Research, Redmond, Washington, USA

Research internship with Paul Smolensky **June to September 2019**

Basler Kantonalbank, Basel, Switzerland

Apprentice in informatics **September 2006 to June 2010**

Awards

NVAIL Pioneering Research Award

- For *Learning to Reason with Third-Order Tensor Products*. Received at NeurIPS, 2018.

University of St Andrews

- Medal for the best dissertation in Computer Science, 2016

Reviewing

NeurIPS 19/20/21, ICML 20/21, ICLR 20/21/22