Róbert Csordás

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EDUCATION

IDSIA http://idsia.ch, Lugano, Switzerland
PhD student 2018-pesent
Supervised by Prof. Jürgen Schmidhuber. Working on systematic generalization.

Budapest University of Technology and Economics, Budapest, Hungary
Electrical Engineering. MSc (grad. 2015) and BSc (grad. 2012). Grade: excellent.

WORK EXPERIENCE

DeepMind - https://www.deepmind.com 2022-present
Research Scientist Intern London, United Kingdom
Working on improving big language models.

AImotive (formerly AdasWorks) - https://aimotive.com 2015-2018
AI Research Scientist Budapest, Hungary
Worked on deep neural networks for self driving cars.

- Monocular depth prediction using neural networks.
- Neural stereo matching - predicting robust depth map with neural network.
- Recurrent network research - Convolutional LSTMs for stabilizing detections, free space detection, etc.
- Object detection, semantic segmentation

Hungarian Academy of Sciences - Institute for Computer Science and Control - https://www.sztaki.hu 2015
Software Engineer Budapest, Hungary
Worked on classical computer vision projects. For example:

- Detecting objects thrown over the fence; detecting human leaving a car.
- Autonomous forklift control system.

Innomed Medical Inc. - http://innomed.hu 2007 - 2015
Embedded Software/Hardware Engineer Budapest, Hungary

- Designed the software architecture of Linux based patient monitor (C++, QT).
- Maintained the software of the InnoCare-S patient monitor (C++).
- Wrote low level hardware drivers for InnoCare-T12.

PUBLICATIONS

Borja Ibarz, Vitaly Kurin, George Papamakarios, Kyriacos Nikiforou, Mehdi Bennani, Róbert Csordás, Andrew Dudzik, Matko Bošnjak, Alex Vitvitskyi, Yulia Rubanova, Andreea Deac, Beatrice Bevilacqua, Yaroslav Ganin, Charles Blundell, Petar Veličković: **A Generalist Neural Algorithmic Learner** - We show that graph neural networks are capable of learning many algorithms together and they can generalize to larger problem instances. https://arxiv.org/abs/2209.11142

Kazuki Irie*, Róbert Csordás*, Jürgen Schmidhuber: **The Dual Form of Neural Networks Revisited: Connecting Test Time Predictions to Training Patterns via Spotlights of Attention** - We investigate dual form representations of NNs to get insights into how their behaviour depends on the training samples.
ICML 2022 https://arxiv.org/abs/2202.05798

Kazuki Irie, Imanol Schlag, Róbert Csordás, Jürgen Schmidhuber: **A Modern Self-Referential Weight Matrix That Learns to Modify Itself**
ICML 2022 https://arxiv.org/abs/2202.05780

Róbert Csordás, Kazuki Irie, Jürgen Schmidhuber: **The Neural Data Router: Adaptive Control Flow in Transformers Improves Systematic Generalization** - We propose to improve data routing in Transformers by gating and geometric attention, achieving systematic generalization on algorithmic tasks.
ICLR 2022 https://arxiv.org/abs/2110.07732

Róbert Csordás, Kazuki Irie, Jürgen Schmidhuber: **The Devil is in the Detail: Simple Tricks Improve Systematic Generalization of Transformers** - We significantly improve the systematic generalization of Transformers on a variety of systematic generalization datasets using simple tricks.
EMNLP 2021 https://arxiv.org/abs/2108.12284

Kazuki Irie, Imanol Schlag, Róbert Csordás, Jürgen Schmidhuber: **Going Beyond Linear Transformers with Recurrent Fast Weight Programmers** - We we explore the recurrent Fast Weight Programmers (FWPs), which exhibit advantageous properties of both Transformers and RNNs.
NeurIPS 2021 https://arxiv.org/abs/2106.06295

Róbert Csordás, Sjoerd van Steenkiste, Jürgen Schmidhuber: **Are Neural Nets Modular? Inspecting Functional Modularity Through Differentiable Weight Masks** - We develop a method for analyzing emerging functional modularity in neural networks based on differentiable weight masks and use it to point out important issues in current-day neural networks.
ICLR 2021 https://openreview.net/forum?id=7uVcpu-gMD

Róbert Csordás, Jürgen Schmidhuber: **Improving Differentiable Neural Computers Through Memory Masking, De-allocation, and Link Distribution Sharpness Control** - Addresses 3 different issues with the original DNC architecture. Also proposes a new, better content-based lookup mechanism.
ICLR 2019 https://openreview.net/forum?id=HyGEM3C9KQ

Róbert Csordás, László Havasi, and Tamás Szirányi: **Detecting objects thrown over fence in outdoor scenes** - A new technique for detecting objects thrown over a critical area of interest in a video sequence made by a monocular camera.
VISAPP 2015 http://goo.gl/ZDkk4g

WORKSHOP PAPERS

Kazuki Irie, Imanol Schlag, Róbert Csordás, Jürgen Schmidhuber: **Improving Baselines in the Wild**
NeurIPS 2021 DistShift https://openreview.net/forum?id=9vxOrkNTs1x

HIGH SCHOOL PUBLICATIONS

CallTheTux - Development of CallTheTux, a universal GSM stack for Linux.
Petnica Papers, 2007 https://goo.gl/QTCy5U

RealVM - Development of a new type of virtual machine which would allow parallel execution and fast switching between different operating systems.
Petnica Papers, 2006 https://goo.gl/8TNHf5

PrologAPI - Enabling the usage of Prolog constructs from C++.
Petnica Papers, 2005 https://goo.gl/KpV3sF

PATENTS

Róbert Csordás, Ágnes Kis-Benedek, Balázs Szalkai: **Method and Apparatus for**

Generating a Displacement Map of an Input Dataset Pair - A neural network based method for fast and robust stereo matching for depth map generation.
US10380753 `https://pimg-fpiw.uspto.gov/fdd/53/807/103/0.pdf`

TECHNICAL STRENGTHS

Python, PyTorch, TensorFlow, C, C++, CUDA, OpenCV, Algorithms, Linux, JavaScript, Bash, Matlab, Assembly

OTHER SKILLS

Machine learning frameworks: PyTorch, TensorFlow, Torch
Parallel programming: CUDA, numba
Electronics: KiCAD, Eagle, PIC, PIC32, AVR, AVR32, ARM, XMOS, Xilinx
Databases: MySQL, MongoDB, Sphinx search
JavaScript technologies: NodeJS, jQuery
Mobile development: Android, iOS (Swift)
Operating systems: Linux, OS X, Windows
Markup languages: LaTeX, XML, Markdown

HOBBY PROJECTS

MobilECG II - `https://github.com/robertcsordas/MobilECG-II` 2014 - 2016
Open source Holter ECG. Designed the schematic diagram and the firmware.

engineerjs.com - `http://engineerjs.com` 2013 - 2015
Extendable online computing environment for engineers, with physical quantity, complex numbers and linear algebra support.

LANGUAGES

Hungarian (native); English, Serbian (fluent); German, Italian (beginner)