KARL STELZNER

Machine Learning Researcher

stelzner.karl@gmail.com +49 172 8150576 github.com/stelzner

EDUCATION

Machine Learning Researcher and PhD Candidate — **AI & ML Lab, TU Darmstadt**
Research into unsupervised scene understanding. Nov. 2017 - November 2023
Developed novel ML models for images, video, and 3D.
Advisor: Kristian Kersting, grade: **Summa Cum Laude** (Passed with distinction)

MSc Computer Science — **TU Dortmund**
GPA: 1.3 (1.0 is the best possible) Oct. 2013 - Oct. 2017
Studied abroad at Butler University, Indianapolis in 2014/15.

BSc Computer Science — **TU Dortmund**
GPA: 1.4 (1.0 is the best possible) Oct. 2011 - Sep. 2013
Completed first year classes while in high school from 2008-2011.

EXPERIENCE

Applied Scientist Intern — **Amazon Alexa AI, Seattle** (remote)
Researched incremental learning methods for large scale text classification. June 2020 - Sep. 2020

Research Assistant — **AI Lab, TU Dortmund**
Administrated compute cluster for machine learning research. 2016 - 2017
Developed custom software for authentication, monitoring, and job management.

Student Software Engineer — **Stadtwerke Schwerte**
Developed and administrated web applications at local fibre provider. Mar. 2009 - Dec. 2011

SELECTED PUBLICATIONS

Karl Stelzner.Elements of Unsupervised Scene Understanding: Objectives, Structures, and Modalities. PhD Thesis, TU Darmstadt, 2023.

Karl Stelzner, Kristian Kersting, Adam R. Kosiorek. Decomposing 3D Scenes into Objects via Unsupervised Volume Segmentation. arXiv:2104.01148, CoRR, 2021.

Robert Peharz, Steven Lang, Antonio Vergari, **Karl Stelzner**, Alejandro Molina, Martin Trapp, Guy Van den Broeck, Kristian Kersting, Zoubin Ghahramani. Einsum Networks: Fast and Scalable Learning of Tractable Probabilistic Circuits. In **ICML 2020**.

Karl Stelzner, Kristian Kersting, Adam R. Kosiorek. Generative Adversarial Set Transformers. In: *Workshop on Object-Oriented Learning at ICML 2020*.

Jannik Kossen*, **Karl Stelzner***, Marcel Hussing, Class Voelcker, Kristian Kersting. Structured Object-Aware Physics Prediction for Video Modeling and Planning. In **ICLR 2020**. (* equal contribution)

Karl Stelzner, Robert Peharz, Kristian Kersting. Faster Attend-Infer-Repeat with Tractable Probabilistic Models. In **ICML 2019**. Also in: *Workshop on Tractable Probabilistic Models at ICML 2019*, awarded best paper award.

Robert Peharz, Antonio Vergari, **Karl Stelzner**, Alejandro Molina, Xiaoting Shao, Martin Trapp, Kristian Kersting, Zoubin Ghahramani. Random Sum-Product Networks: a Simple but Effective Approach to Probabilistic Deep Learning. In **UAI 2019**.

OPEN SOURCE

In addition to the code for my own research, I have independently created open source reference implementations for the following works:

- **Object Scene Representation Transfomer** by Sajjadi et al. (Google Research). 2023
- **Scene Representation Transfomer** by Sajjadi et al. (Google Research). 2022
  These implementations have kindly been endorsed as a reference implementation by the authors.
- **MONet: Unsupervised Scene Decomposition and Representation** by Burgess et al. (DeepMind). 2019
- **Visual Interaction Networks** by Watters et al. (DeepMind). 2019
  Based on a prior third-party implementation.

TEACHING

Teaching assistant for the following classes:

- *Introduction to Artificial Intelligence* 2018 - 2022
- *Statistical Machine Learning* 2020
- *Probabilistic Graphical Models* 2017, 2018
- *Foundations of Theoretical Computer Science* 2013

Additionally, I have supervised 3 BSc and 6 MSc theses.

REVIEWING

Served as reviewer at:

- *International Conference on Learning Representations* (ICLR) 2021, 2022, 2023
- *Advances in Neural Information Processing Systems* (NeurIPS) 2020, 2021, 2023
- *International Conference on Machine Learning* (ICML) 2020 (emergency reviewer), 2022
- *International Joint Conference on Artificial Intelligence* (IJCAI) 2020 (emergency reviewer)

INVITED TALKS

- **3D Geometry: The Latent Variable We Can Touch** April 2022
  ICLR 2022 workshop on objects, structure, and causality (online).
- **Decomposing 3D Scenes into Objects via Unsupervised Volume Segmentation** April 2021
  Visitor's talk at DeepMind (online).
- **Generative Modelling with Neural Radiance Fields** March 2021
  KAIST AI colloquium (online), with Adam Kosiorek.
- **The Expressiveness-Tractability Trade-off** October 2019
  OxCSML Lab (Yee Whye Teh), University of Oxford.

AWARDS AND HONORS

Outstanding reviewer award at ICLR. 2021

Best Paper Award from the *Workshop on Tractable Probabilistic Models at ICML*. 2019

Deutschlandstipendium (German National Scholarship) 2011 - 2014

Placed top 1000 out of over 30.000 at the **Google Code Jam** programming competitions 2020, 2021