

Karsten Roth

🏠 karroth.com | ✉ karsten.rh1@gmail.com | in karsten-roth | 🌐 confusezius

Languages

German (native), English (fluent), Mandarin (fluent), French (elementary)

RESEARCH EXPERIENCE

Research Intern

Amazon, AWS

Oct 2020 – Mar 2020

Tuebingen, Germany

Research intern at the Amazon AWS Research Lablet supervised by Dr. Peter Gehler, Prof. Thomas Brox and Prof. Bernhard Schoelkopf working on weakly supervised (*cold-start*) anomaly detection.

Remote Research Intern

Vector Institute

May 2020 – Sep 2020

Toronto, Canada

Remote Research intern at the Vector Institute supervised by Prof. Marzyeh Ghassemi. Worked on few-shot and zero-shot learning problems, both fundamentally and with applications to the medical domain, including incremental few-shot learning for multilabel Chest Xrays. One first author publication at ICML 2021.

Research Intern

Montreal Institute for Learning Algorithms (MILA)

Sep 2020 – Mar 2020

Montreal, Canada

Research intern at MILA under supervision of Dr. Joseph Paul Cohen and Prof. Yoshua Bengio. Worked on unsupervised representation learning and transfer learning for 3D CT data as well as fundamental Deep Metric Learning, with two publications at ICML 2020 and ECCV 2020.

Student Researcher

Heidelberg Collaboratory for Image Processing (HCI)

Feb 2018 – present

Heidelberg, Germany

Worked on feature mining and training policies for improved generalization in Deep Metric Learning, supervised by Biagio Brattoli, Timo Milbich and Prof. Bjoern Ommer. Resulted in three publications at ICCV 2019, TPAMI 2020 and CVPR 2020.

Student Researcher

Center for Integrative Infectious Diseases Research (CIID)

Feb 2017 – Sep 2019

Heidelberg, Germany

Worked at the Center for Integrative Infectious Disease Research in collaboration with the Heidelberg Collaboratory for Image Processing (HCI), supervised by PD Alessia Ruggieri and Prof. Fred Hamprecht. Topics included tracking and data colocalization for Hepatitis-C infected cells to investigate oscillatory stress behaviour and automatic image-based evaluation of gel electrophoresis samples.

Student Researcher

University Hospital Mannheim (UMM)

Jul 2017 – May 2019

Mannheim, Germany

Worked at the Experimental Oncology Group at the University Hospital Mannheim under the supervision of Dr. Tomasz Konopczynski and Prof. Juergen Hesser. Main focus was placed on Medical Image Analysis, specifically Semantic Segmentation of Liver and Liver Lesions in CT data. Two publications at ISBI 2020 and ISBE 2020.

Intern

Ion Quantum Trapping Group (IQT), Sussex University

Aug 2013 – Apr 2014

Brighton, United Kingdom

Internship at the Ion Quantum Trapping group (IQT). Worked on Quality-of-Life duties (circuit board generation, soldering and switches), and frequency modulation systems. Supervised by Dr. Sebastian Weidt and Prof. Winfried Hensinger. Publication at Annual Physics Review 2014.

→ Publications on the last page.

EDUCATION

PhD Computer Science Tuebingen, Germany
ELLIS *since 2021*

Supervisors: Prof. Zeynep Akata (University of Tuebingen), Prof. Oriol Vinyals (Deepmind).

Topic: *Multimodal explainable & generalizing representation learning.*

Master Thesis Physics Heidelberg, Germany
Heidelberg University *2020 – 2021*

Topic: *Understanding and Improving Generalization in Deep Metric Learning.* Final Grade: 1.0/4.0 (Best: 1.0).

M.Sc Physics Heidelberg University *2017 – 2021*

Final Grade Average: 1.1/4.0 (Best: 1.0). Focus on Machine Learning, Computer Vision, Medical and Solid State Physics.

Bachelor Thesis Physics Heidelberg University *2017*

Topic: *Liver Lesion Segmentation from 3D CT Scans.*

B.Sc Physics Heidelberg University *2014 – 2017*

Completed with Grade 1.5/4.0 (Best: 1.0).

Abitur (A-Levels) Walldorf, Germany
Gymnasium Walldorf *2006 – 2013*

Completed with Grade 1.1/4.0 (Best: 1.0).

EXTRACURRICULAR ACTIVITIES & AWARDS

Participant at the Machine Learning Summer School 2020 Participated at the MLSS 2020 in Tuebingen.

Life-Science Lab Mentor Introducing high school students to biomathematical and medical image analytical topics and mentoring group projects since Sep. 2016. The Heidelberg Life-Science Lab is an initiative founded by the German Cancer Research Center (DKFZ).

Best Abitur in Physics Award Received for the best physics A-levels at a given school.

Google Science Fair Top 90 Reached global top 90 with a project on 3D photogrammetry.

PUBLICATIONS

- [1] **Karsten Roth***, Timo Milbich*, Samarth Sinha, Prateek Gupta, Bjoern Ommer, Joseph Paul Cohen. "Revisiting Training Strategies and Generalization in Deep Metric Learning". In *Proceedings of the 37th International Conference on Machine Learning, Online, PMLR 119*, 2020.
- [2] Timo Milbich*, **Karsten Roth***, Biagio Brattoli, Bjoern Ommer. "Sharing Matters for Generalization in Deep Metric Learning". In *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 2020.
- [3] Timo Milbich*, **Karsten Roth***, Homanga Bharadhwaj, Samarth Sinha, Yoshua Bengio, Bjoern Ommer, Joseph Paul Cohen. "DiVA: Diverse Visual Feature Aggregation for Deep Metric Learning". In *The European Conference on Computer Vision (ECCV)*, 2020.
- [4] **Karsten Roth***, Timo Milbich*, Bjoern Ommer. "PADS: Policy-adapted Sampled for Visual Similarity Learning". In *The IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, 2020.
- [5] **Karsten Roth***, Biagio Brattoli*, Bjoern Ommer. "MIC: Mining Interclass Characteristics for Deep Metric Learning". In *Proceedings of the IEEE International Conference on Computer Vision*, pp.8000–8009, 2019.
- [6] **Karsten Roth**, Juergen Hesser, Tomasz Konopczynski. "Mask Mining for Improved Liver Lesion Segmentation". In *The IEEE International Symposium on Biomedical Imaging (ISBI)*, 2020.
- [7] Joseph Paul Cohen, Lan Dao, **Karsten Roth**, Paul Morrison, Yoshua Bengio, Alman F. Abbasi, Beiyi Shen, Hoshmand K. Mahsa, Marzyeh Ghassemi, Haifang Li, Tim Duong. "Predicting COVID-19 Pneumonia Severity on Chest X-ray With Deep Learning". In *Cureus 12(7)*, 2020.
- [8] Katharina I. Jerg, Rene Philipp Austermuehl, **Karsten Roth**, Jonas Grosse Sundrup, Guido Kanschat, Juergen Hesser, Lisa Wittmayer. "Diffuse domain method for needle insertion simulations". In *International Journal for Numerical Methods in Biomedical Engineering 36(9)*, 2020.
- [9] Joe Randall, Sebastian Weidt, Eamon D. Standing, Kimberly Lake, Simon C. Webster, David F. Murgia, Tomas Navickas, **Karsten Roth**, Winfried K. Hensinger. "Efficient preparation and detection of microwave dressed-state qubits and qutrits with trapped ions". In *Phys. Rev. A 91, 012322*, 2015.

PREPRINTS

- [1] Joseph Paul Cohen, Paul Morrison, Lan Dao, **Karsten Roth**, Tim Q Duong, Marzyeh Ghassemi "COVID-19 Image Data Collection: Prospective Predictions Are the Future". In *arXiv preprint arXiv:2006.11988*, 2020.
- [2] **Karsten Roth**, Tomasz Konopczyński, Jürgen Hesser "Liver Lesion Segmentation with slice-wise 2D Tiramisu and Tversky loss function". In *arXiv preprint arXiv:1905.03639*, 2019.
- [3] Patrick Bilic, Patrick Ferdinand Christ, Eugene Vorontsov, Grzegorz Chlebus, Hao Chen, Qi Dou, Chi-Wing Fu, Xiao Han, Pheng-Ann Heng, Jürgen Hesser, Samuel Kadoury, Tomasz Konopczynski, Miao Le, Chunming Li, Xiaomeng Li, Jana Lipková, John Lowengrub, Hans Meine, Jan Hendrik Moltz, Chris Pal, Marie Piraud, Xiaojuan Qi, Jin Qi, Markus Rempfler, **Karsten Roth**, Andrea Schenk, Anjany Sekuboyina, Ping Zhou, Christian Hülsemeyer, Marcel Beetz, Florian Ettliger, Felix Grün, Georgios Kaissis, Fabian Lohöfer, Rickmer Braren, Julian Holch, Felix Hofmann, Wieland Sommer, Volker Heinemann, Colin Jacobs, Gabriel Efrain Humpire Mamani, Bram van Ginneken, Gabriel Chartrand, An Tang, Michal Drozdal, Avi Ben-Cohen, Eyal Klang, Marianne M Amitai, Eli Konen, Hayit Greenspan, Johan Moreau, Alexandre Hostettler, Luc Soler, Refael Vivanti, Adi Szeskin, Naama Lev-Cohain, Jacob Sosna, Leo Jaskowicz, Bjoern H Menze. "The Liver Tumor Segmentation Benchmark (LiTS)". In *arXiv preprint arXiv:1901.04056*, 2019.