Teresa Klatzer

PhD Researcher at the University of Edinburgh, UK | E-mail | Website | Scholar Profile | Github | Linkedin
Nationality: Austrian | Languages: German, English, French

Summary

Passionate researcher at the intersection of machine learning, Bayesian computation, and imaging inverse problems with a strong background in computer science and mathematics. Skilled in Python, PyTorch, and various ML libraries. Excellent problem-solving, writing, and collaboration abilities. Seeking a challenging interdisciplinary research position to contribute to cutting-edge science and the future of fundamental research in probabilistic AI.

Research Experience

Postgraduate Researcher Sept 2021 – Present
University of Edinburgh *Edinburgh, UK*

- Developed accelerated algorithms for Bayesian computation incorporating machine learning models using PyTorch and Matlab
- State-of-the-art results for reconstructing photon-starved imaging data providing uncertainty quantification
- Convergence results for convex and data-driven ML priors
- Interdisciplinary collaboration with researchers in the fields of computer science, mathematics, and statistics
- Running large-scale experiments using server infrastructure and benchmarking
- Dissemination of research through publishing of scientific papers with source code, regular presenting at international meetings
- Additional training in Scalable Inference and Deep Learning, Uncertainty Quantification (at DTU Compute), and by the APTS (Academy for PhD Training in Statistics)

Research Assistant July 2014 – Sept 2017
Graz University of Technology *Graz, Austria*

- Researcher in the Computer Vision, Learning and Optimization Group, led by Prof. Thomas Pock
- Development of variational networks including learnt activation functions
- Solving a wide range of image reconstruction problems (joint denoising and demosaicing or super-resolution problems, joint reconstruction and classification problems, medical image reconstruction problems)
- Developing algorithms using convex and non-convex optimization strategies, bi-level optimization and algorithm unrolling
- Co-developing learning frameworks using theano, tensorflow, pytorch and C++/CUDA

Education

University of Edinburgh Edinburgh, UK
PhD in Applied and Computational Mathematics *Sept 2021 – Aug 2025 (ongoing)*

- Supervisors: Prof. Konstantinos Zygalakis and Prof. Marcelo Pereyra
- Research project: "Bayesian computation for low-photon imaging"

Graz University of Technology, Austria Graz, Austria
MSc in Telematics (Computer and Information Engineering) *Oct 2012 – Sept 2014*

- With distinction
- Majors in Computational Intelligence and Software Technology
- Master's thesis: Bi-level Optimization for Support Vector Machines, supervised by Prof. Thomas Pock
- Project: State Estimation with Recurrent Neural Networks, supervised by Prof. Robert Legenstein

Graz University of Technology, Austria Graz, Austria
BSc in Telematics (Computer and Information Engineering) *Oct 2008 – Sept 2012*

- Interdisciplinary study: Information technology, electrical engineering, computer science

Université Lille 1 Science et Technologies, France Villeneuve-d'Ascq, France
Erasmus Program *Sept 2011 – Jan 2012*

- Project: Map Reduce Programming for Machine Learning Algorithms on Graphs, supervised by Marc Tommasi and Gemma C. Garriga at INRIA

Skills and Expertise

Research areas: Computational Statistics, Probabilistic Methods, Machine Learning, Neural Networks, Uncertainty Quantification, Optimization, Inverse Problems, Imaging Science

Programming Languages: Python, Matlab, C++, C, CUDA, Java

Deep Learning Frameworks: PyTorch, Theano, TensorFlow

Libraries & Tools: Git, NumPy, Pandas, Scikit-learn, OpenCV, DeepInv, Hadoop

Management: Agile software development, Scrum, Coaching

Teaching Experience

University Tutor Jan 2022 – Present
University of Edinburgh *Edinburgh, UK*
- Subjects: Machine Learning in Python, Calculus, Linear Algebra, Stochastic and Ordinary Differential Equations

Teaching Assistant 2010 – 2015
Graz University of Technology *Graz, Austria*
- Subjects: Convex Optimization, Analysis, Computer and communication networks

Leadership

Product Owner and Agile Coach April 2020 – Aug 2021
Black Tusk GmbH *Graz, Austria*
- Project lead for several (medical) software products
- Portfolio management, customer interviews and requirement engineering
- General management and regulatory affairs for medical devices

Product Owner Nov 2018 – March 2020
Denovo GmbH *Graz, Austria*
- Project lead for several digitization projects, responsibility for product backlog and maximization of business value
- Leading the development and roll-out of an AI tool for waste management
- Active management of client relations and business development, scrum and team development

Project Manager for Digital Business Solutions Jan 2018 – Oct 2018
Scoop and Spoon GmbH *Graz, Austria*
- Project lead for digital products, responsibility for budget, time, project quality and controlling
- Mediation between teams and all stakeholders

Honors and awards

SIAM Travel Award and Laura Wisewell Travel Scholarship 2024
- Travel funding to attend the SIAM Imaging Science conference in Atlanta, GA, USA.

Laura Wisewell Travel Scholarship 2023
- Travel funding to attend the Mathematics and Image Analysis conference in Berlin, Germany.

Best Paper Award 2017
- German Conference on Pattern Recognition, Basel, Switzerland
- Paper title: "Variational Networks: Connecting Variational Methods and Deep Learning"

Best Paper Award 2015
- Computer Vision Winter Workshop, Seggau, Austria
- Paper title: "Continuous Hyper-parameter Learning for Support Vector Machines"

Scholarship of Excellence 2012
- Graz University of Technology

Volunteering and Soft Skills

Committee member of Piscopia 2023-2024
- Organising activities supporting women and non-binary students doing PhDs in Mathematics

Co-founder of a Youtube channel, "Warum nicht leicht" 2020-2021
- Production of educational videos and other content about personal development

Life coaching and Counselling certification at Balancakademie in Graz, Austria 2018-2020
- 600h training and 750h practice

Founding member of a dance association, Salsativity.org, Graz, Austria. 2018

Referees

Prof Konstantinos Zygalakis, University of Edinburgh, k.zygalakis@ed.ac.uk
Prof Marcelo Pereyra, Heriot-Watt University, Edinburgh, m.pereyra@hw.ac.uk
Dr Tobías I. Liaudat, IRFU, CEA Paris-Saclay, Gif-sur-Yvette, France, tobiasliaudat@gmail.com
Dr Paul Dobson, Heriot-Watt University, Edinburgh, p.dobson_1@hw.ac.uk

Talks and Posters

WiML Workshop at NeurIPS, Vancouver, Canada. (2024). *Poster and contributed talk title: Mirror Langevin Dynamics with Plug-and-Play Priors for Poisson Inverse Problems*.

ICMS Workshop UQIPI24: UQ for Inverse Problems and Imaging, Edinburgh, UK. (2024). *Talk title: Bayesian Computation with Plug and Play Priors for Poisson Inverse Problems*.

Mini-symposium "Deep Unrolled Methods for Inverse Imaging Problems" at SIAM Imaging in Atlanta, Georgia, USA. (2024). *Talk title: Bayesian Computation with Plug and Play Priors for Poisson Inverse Problems*.

ICMS workshop on Imaging Inverse Problems and Generating Models: Sparsity and Robustness versus Expressivity, Edinburgh, UK. (2024). *Poster title: Bayesian Computation with Plug-and-Play Priors for Poisson Inverse Problems*.

Mini-symposium "Advances in Bayesian Inverse Problems" at SIAM Conference of Uncertainty Quantification 2024, Trieste, Italy (Invited). (2024). *Talk title: Accelerating MCMC for UQ in Imaging Science by Relaxed Proximal-point Langevin Sampling*.

Applied Inverse Problems (AIP) Conference in Göttingen, Germany. (2023). *Talk title: Accelerating MCMC for imaging science by using an implicit Langevin algorithm*.

Mathematics and Image Analysis (MIA) in Berlin, Germany. (2023). *Poster title: Accelerating MCMC by using an implicit method with applications in imaging science*.

ICMS Workshop on Interfacing Bayesian Statistics, Deep Learning, and Mathematical Analysis for Imaging Inverse Problems, Edinburgh, UK. (2023). *Poster title: Accelerating MCMC by using an implicit method with applications in imaging science*.

Mini-symposium on "Non-standard regularisation: theory and applications" at the Applied Inverse Problems (AIP) conference in Hangzhou, China. (2017). *Talk title: Deep Regularization*.

Interdisciplinary data science workshop on "Mathematical imaging with partially unknown models" in Cambridge, UK. (2017). *Talk title: Learning Variational Networks for Solving Inverse Problems in Imaging*.

International Conference on Computational Photography, Chicago, IL. (2016). *Talk title: Joint Demosaicing and Denoising Based on Sequential Energy Minimization*.

Publications

Klatzer, T., Dobson, P., Altmann, Y., Pereyra, M., Sanz-Serna, J. M., & Zygalakis, K. C. (2024). Accelerated Bayesian imaging by relaxed proximal-point Langevin sampling. *SIAM Journal on Imaging Sciences*, *17*(2), 1078–1117.

Effland, A., Hölzel, M., Klatzer, T., Kobler, E., Landsberg, J., Neuhäuser, L., Pock, T., & Rumpf, M. (2018). Variational networks for joint image reconstruction and classification of tumor immune cell interactions in melanoma tissue sections. *Bildverarbeitung in der Medizin*, 334–340.

Hammernik, K., Klatzer, T., Kobler, E., Recht, M. P., Sodickson, D. K., Pock, T., & Knoll, F. (2018). Learning a variational network for reconstruction of accelerated mri data. *Magnetic Resonance in Medicine*, *79*(6), 3055–3071.

Klatzer, T., Soukup, D., Kobler, E., Hammernik, K., & Pock, T. (2017). Trainable regularization for multi-frame superresolution. In V. Roth & T. Vetter (Eds.), *Pattern recognition* (pp. 90–100). Springer International Publishing.

Kobler, E., Klatzer, T., Hammernik, K., & Pock, T. (2017). Variatonal networks: Connecting variational methods and deep learning. *Pattern Recognition. GCPR German Conference on Pattern Recognition (GCPR)*, 281–293.

Klatzer, T., Hammernik, K., Knobelreiter, P., & Pock, T. (2016). Learning joint demosaicing and denoising based on sequential energy minimization. *IEEE International Conference on Computational Photography (ICCP)*, 1–11.

Klatzer, T., & Pock, T. (2015). Continuous hyper-parameter learning for support vector machines. *Proceedings of the 20th Computer Vision Winter Workshop, Seggau, Austria*.