Thomas Möllenhoff

Research Scientist ⋄ RIKEN Center for Advanced Intelligence Project
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RESEARCH INTEREST

My current research focuses on the design and analysis of new algorithms to improve deep learning via Bayesian principles, with the aim to develop methods that are robust, adaptable and more interpretable.

EMPLOYMENT

Research Scientist (tenured, ≈ equivalent to Assistent Professor) — since April 2023
RIKEN Center for Advanced Intelligence Project, Tokyo, Japan

Postdoctoral Researcher, Approximate Bayesian Inference Team — 2020 – March 2023
RIKEN Center for Advanced Intelligence Project, Tokyo, Japan

PhD Student, Computer Vision Group — 2014 – 2020
Technical University of Munich, Garching, Germany

EDUCATION

Technical University of Munich
Ph.D. in Computer Science (summa cum laude) — 2014 – 2020
Supervisor: Prof. Dr. Daniel Cremers

M.Sc. in Computer Science (grade: 1.0/1.0 (4.0 GPA equivalent), top 8/321 graduates) — 2010 – 2014
Supervisor: Prof. Dr. Daniel Cremers

B.Sc. in Computer Science, Minor: Mathematics — 2007 – 2010

Technical University of Denmark
Visiting Student at DTU Compute — 2012 – 2013

LIST OF PUBLICATIONS

1. E. M. Kiral, T. Möllenhoff, and M. E. Khan. The Lie-Group Bayesian Learning Rule. In *International Conference on Artificial Intelligence and Statistics (AISTATS)*, 2023.
2. T. Möllenhoff and M. E. Khan. SAM as an Optimal Relaxation of Bayes. In *International Conference on Learning Representations (ICLR)*, 2023. **Notable top 5% of accepted papers**.
3. Z. Ye, B. Haefner, Y. Quéau, T. Möllenhoff, and D. Cremers. A cutting-plane method for sublabel-accurate relaxation of problems with product label spaces. *International Journal of Computer Vision*, 131(1):346–362, 2023.
4. H. Dröge, T. Möllenhoff, and M. Moeller. Non-smooth energy dissipating networks. In *IEEE Conference on Image Processing (ICIP)*, 2022.
5. H. Bauermeister, E. Laude, T. Möllenhoff, and D. Cremers. Lifting the convex conjugate in Lagrangian relaxations: A tractable approach for continuous Markov random fields. *SIAM Journal on Imaging Sciences*, 15(3):1253–1281, 2022.
6. Z. Ye, B. Haefner, Y. Quéau, T. Möllenhoff, and D. Cremers. Sublabel-accurate multilabeling meets product label spaces. In *DAGM German Conference on Pattern Recognition (GCPR)*, 2021.

7. Z. Ye, T. Möllenhoff, T. Wu, and D. Cremers. Optimization of graph total variation via active-set-based combinatorial reconditioning. In *International Conference on Artificial Intelligence and Statistics (AISTATS)*, 2020.

8. P. Bréchet, T. Wu, T. Möllenhoff, and D. Cremers. Informative GANs via structured regularization of optimal transport. *Optimal Transport and Machine Learning (NeurIPS Workshops)*, 2019.

9. M. Moeller, T. Möllenhoff, and D. Cremers. Controlling neural networks via energy dissipation. In *International Conference on Computer Vision (ICCV)*, 2019.

10. T. Möllenhoff and D. Cremers. Flat metric minimization with applications in generative modeling. In *International Conference on Machine Learning (ICML)*, 2019. **Full Oral Presentation**.

11. T. Möllenhoff and D. Cremers. Lifting vectorial variational problems: A natural formulation based on geometric measure theory and discrete exterior calculus. In *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, 2019. **Oral Presentation**.

12. B. Haefner, T. Möllenhoff, Y. Queau, and D. Cremers. Fight ill-posedness with ill-posedness: Single-shot variational depth super-resolution from shading. In *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, 2018. **Spotlight Presentation**.

13. T. Frerix, T. Möllenhoff, M. Moeller, and D. Cremers. Proximal backpropagation. In *International Conference on Learning Representations (ICLR)*, 2018.

14. T. Möllenhoff, Z. Ye, T. Wu, and D. Cremers. Combinatorial preconditioners for proximal algorithms on graphs. In *International Conference on Artificial Intelligence and Statistics (AISTATS)*, 2018.

15. T. Möllenhoff and D. Cremers. Sublabel-accurate discretization of nonconvex free-discontinuity problems. In *International Conference on Computer Vision (ICCV)*, 2017.

16. E. Laude, T. Möllenhoff, M. Moeller, J. Lellmann, and D. Cremers. Sublabel-accurate convex relaxation of vectorial multilabel energies. In *European Conference on Computer Vision (ECCV)*, 2016.

17. T. Möllenhoff, E. Laude, M. Moeller, J. Lellmann, and D. Cremers. Sublabel-accurate relaxation of nonconvex energies. In *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, 2016. **Best Paper Honorable Mention**.

18. T. Möllenhoff, E. Strekalovskiy, M. Moeller, and D. Cremers. The primal-dual hybrid gradient method for semiconvex splittings. *SIAM Journal on Imaging Sciences*, 8(2):827–857, 2015.

19. T. Möllenhoff, E. Strekalovskiy, M. Moeller, and D. Cremers. Low rank priors for color image regularization. In *Energy Minimization Methods in Computer Vision and Pattern Recognition (EMMCVPR)*, 2015.

20. T. Möllenhoff, C. Nieuwenhuis, E. Toeppe, and D. Cremers. Efficient convex optimization for minimal partition problems with volume constraints. In *Energy Minimization Methods in Computer Vision and Pattern Recognition (EMMCVPR)*, 2013.

TEACHING (SELECTION)

Convex Optimization for Machine Learning and Computer Vision — Summer 2016, 2017
Lecturer & Teaching Assistant

Practical Course: GPU Programming in Computer Vision — Summer 2014, 2015, 2017
Lecturer & Teaching Assistant — Winter 2014, 2015

Computer Vision I: Variational Methods — Winter 2014, 2016
Teaching Assistant

Combinatorial Optimization in Computer Vision — Winter 2015
Teaching Assistant

Supervision & Mentoring (Selection)

- Emanuel Laude, *Went on to:* Post-doc at KU Leuven
- Zhenzhang Ye, *Went on to:* PhD student at TU Munich
- Sarah Sachs, *Went on to:* PhD student at University of Amsterdam
- Hartmut Bauermeister, *Went on to:* PhD student at University of Siegen
- Pierre Bréchet, *Went on to:* PhD student at MPI-MiS Leipzig
- Happy Buzaaba, *Went on to:* Post-doc at Princeton University

ACADEMIA

Area Chair
ICLR '24, AISTATS '24

Reviewing (Conferences)
NeurIPS (since '18), ICLR (since '19), ICML (since '19), CVPR ('19 – '20), AISTATS (since '21)

Reviewing (Journals)
Transactions on Machine Learning Research (TMLR)
Journal on Machine Learning Research (JMLR)

Organization
ICML Workshop on "Duality Principles for Modern Machine Learning" — July 2023
`http://dp4ml.github.io` — Hawaii, USA

The First Workshop on Bayes-Duality — June 2023
`https://bayesduality.github.io/workshop/` — Atami, Japan

PRIZES & AWARDS

AISTATS Reviewer Award (Top 10%)	2022, 2023
1st place in both tracks at NeurIPS competiton on Approximate Inference ($3000)	2021
NeurIPS Outstanding Reviewer (Top 8%)	2021
ICLR Travel Award ($1000)	2018
CVPR Best Paper Honorable Mention Award	2016

PATENTS

B. Haefner, Y. Queau, T. Möllenhoff, D. Cremers. Depth super-resolution from shading. *US Patent No. 16,400,584.* November 2019.