Jonas Adler

Research Scientist

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Education

2015- **PhD in Applied and Computational Mathematics**, *KTH - Royal Institute of Technology*.
Member of the mathematical imaging group. Supervisor: Ozan Öktem.

- Main developer of open source framework for inverse problems: ODL. Widely used with > 4000 commits, > 5000 monthly downloads.
  `github.com/odlgroup/odl`
- 3 pre-prints, 4 journal and 6 conference articles published in high impact journals including IEEE Transactions of Medical Imaging, Inverse Problems and NIPS. Invited talks at 9 conferences and several universities.
- Highly active member of the research community. Collaborations with key research institutions including UCL, Cambridge and Stanford. Organized several workshops, minisymposiuma and courses.
- Reviewer for several high impact journals in mathematics and imaging.

2009-2013 **MSc in Engineering Physics**, *KTH - Royal Institute of Technology*.
Finished 6 months ahead of schedule with GPA 4.93/5.00.
Head of physics chapter committee for equality 2010-2011.

Employment

2013- **Research Scientist**, *Elekta*.

- Developed calibration, image quality QA and reconstruction algorithms for radiotherapy applications.
- Member of core technical team for the next generation linear accelerator as company wide machine learning and medical image reconstruction expert.
- Developed several internal software frameworks, including photon Monte Carlo CT simulator, numerical linear algebra and image reconstruction.
- Held internal courses in Git, Python, Scientific Programming and Machine Learning.
- Worked with Chinese offices on regulatory affairs and research.
- 5 Patent applications submitted.

2012-2013 **Software Development Intern**, *EPiQ Life Science*.
Developed Android interface and data processing for a real-time ECG.

2011-2012 **Software Development Intern**, *Giraff Data*.
Main developer for the CloudBall AI Challenge. Developed both C# application and Azure cloud backend.

2010-2011 **Research Intern**, *St. Jude Medical*.
Data analysis for detecting arrhythmia using pacemakers.

Skills

Languages	Fluent in Swedish and English. Basic Chinese.
Programming	Skilled in Python, C++ and CUDA. Proficient in Matlab, C# and Java. Experienced in industrial software development (agile, cloud, version control).
Driving Licence	Car and Motorcycle.

Publications

Pre-prints

2018 **Deep Bayesian Inversion**.
J. Adler and O. Öktem

2018 **Task adapted reconstruction for inverse problems**.
J. Adler, S. Lunz, O. Verdier, C.-B Schönlieb and O. Öktem

2018 **Data-driven nonsmooth optimization**.
S. Banert, A. Ringh, J. Adler, J. Karlsson and O. Öktem

Journal papers

2018 **EDS tomographic reconstruction regularized by total nuclear variation joined with HAADF-STEM tomography**, *Ultramicroscopy*.
Z. Zhong, W.J. Palenstijn, J. Adler and K.J. Batenburg

2018 **Model-Based Learning for Accelerated, Limited-View 3-D Photoacoustic Tomography**, *IEEE Transactions on Medical Imaging*.
A. Hauptmann, F. Lucka, M. Betcke, N. Huynh, J. Adler, B. Cox, P. Beard, S. Ourselin and S. Arridge

2018 **Learned Primal-dual Reconstruction**, *IEEE Transactions on Medical Imaging*.
J. Adler and O. Öktem

2017 **Solving ill-posed inverse problems using iterative deep neural networks**, *Inverse Problems*, Editors highlight.
J. Adler and O. Öktem

Conference papers

2019 **Deep learning framework for digital breast tomosynthesis reconstruction**, *SPIE Medical Imaging*.
N. Moriakov, K. Michielsen, J. Adler, R. Mann, I. Sechopoulosa and J. Teuwen

2018 **Banach Wasserstein GAN**, *Neural Information Processing Systems*.
J. Adler and S. Lunz

2017 **Learning to solve inverse problems using Wasserstein loss**, *NIPS Workshop on Optimal Transport*.
J. Adler, A. Ringh, O. Öktem and J. Karlsson

2017 **GPUMCI, a flexible platform for x-ray imaging on the GPU**, *Fully3D*.
J. Adler, G.J. Bootsma, H. Nordström and M. Eriksson

2017 **Spectral CT reconstruction with anti-correlated noise model and joint prior**, *Fully3D*.
M. Persson and J. Adler

2017 **A modified fuzzy C means algorithm for shading correction in craniofacial CBCT images**, *CMBEBIH*.
A. Ashfaq and J. Adler

2012 **Correlation Between Hemodynamics And Dynamic Impedance At Constant Heart Rate**, *Heart Rhythm*.
M.K.B. Jarverud, K. Noren, T. Svensson, S. Hjelm, M. Hollmark, A. Björling and J. Adler

Patent applications

2018 **Data-driven optimization for automatic radiotherapy planning**.
J. Sjölund and J. Adler

2018 **A modality agnostic method for representation of medical images**.
J. Sjölund and J. Adler

2018 **Deep posterior sampling in imaging**.
J. Adler and O. Öktem

2017 **End to end learned task based image reconstruction**.
J. Adler and O. Öktem

2014 **Patient/object specific dose and scatter estimation in CBCT**.
J. Adler, G.Bootsma, H. Nordström, M. Eriksson, B. Nutti, M. Hennix, D. Jaffray and F. Verhaegen

Participation In Events

Conferences

2019 **Applied Inverse Problems**, Valencia, Spain.
Minisymposium Organizer: *Learned Image Reconstruction in Practice*

2019 **International Congress on Industrial and Applied Mathematics**, Valencia, Spain.
Invited Talk: Deep Posterior sampling

2019 **GAMM 90th annual meeting**, Vienna, Austria.
Invited Talk: Deep learning for inverse problems. Where are we, and how far can we go?

2019 **BASP Frontiers**, Villars-sur-Ollon, Switzerland.
Invited Talk: Deep Posterior Sampling in medical imaging

2019 **Deep Learning and Inverse Problems**, Stockholm, Sweden.
Main organizer of the event.
5 days. 40 attendants from 20 universities.
`https://sites.google.com/view/dlip2019`

2018 **Neural Information Processing Systems**, Montreal, Canada.
Poster: *Banach Wasserstein GAN*

2018 **ICML**, Stockholm, Sweden.

2018 **SIAM Imaging**, Bologna, Italy.
Minisymposium Organizer: *Solving inverse problems in minutes: Software for imaging*
Invited talk: *Learned Iterative Reconstruction for CT*
Invited talk: *Learning to solve inverse problems with ODL*
Poster: *Learning to solve inverse problems using Wassersten Loss*
Poster: *Learning an optimization solver for a class of inverse problems*
Poster: *Learned Primal-Dual Reconstruction*

2018 **High Performance Scientific Computing**, Hanoi, Vietnam.
Invited talk: *What Can We Expect? Computable Upper Bounds to Machine Learning in Inverse Problems Using MCMC*

2018 **Swedish Symposium on Image Analysis**, Stockholm, Sweden.
Contributed talk: Learned Iterative Reconstruction

2017 **Neural Information Processing Systems**, Los Angeles, USA.
Contributed workshop talk: *Learning to solve inverse problems using Wasserstein Loss*

2017 **Generative models, parameter learning and sparsity**, Cambridge, UK.
Contributed talk: *Learned forward operators: Variational regularization for black-box models*

2017 **IMA Conference on Inverse Problems from Theory to Application**, Cambridge, UK.

2017 **Variational Methods Meet Machine Learning**, Cambridge, UK.
Invited Talk: *Learned iterative reconstruction schemes, theory and practice*

2017 **Fully3D**, Xi'an, China.
Contributed poster: *GPUMCI, a flexible platform for x-ray imaging on the GPU*
Contributed poster: *Spectral CT reconstruction with anti-correlated noise model and joint prior*

2017 **Applied Inverse Problems**, Hangzhou, China.
Invited talk: *Using deep learning to reconstruct multi-modal images - A primal dual scheme with examples in PET-MRI*

2017 **Inverse Problems and Data Science**, Edinburgh, UK.
Contributed talk: *Solving ill-posed inverse problems using learned iterative schemes*

2016 **Inverse Problems: Modeling and Simulation**, Ölüdeniz, Fethiye, Turkey.

2015 **IEEE Medical Imaging Conference**, San Diego, USA.
Invited talk: *ODL: A Python library for inverse problems*

2015 **International Congress on Industrial and Applied Mathematics**, Beijing, China.

Visits

2018 **University of Cambridge**, Cambridge, UK.
1 month. Visit to Carola Schönliebs group.

2018 **Chinese Academy of Sciences**, Beijing, China.
Invited seminar: Deep Learning for Image Reconstruction.

2018 **University of Göttingen**, Göttingen, Germany.
1 week. Collaborations with Thorsten Hohages and Tim Saldits' groups on ML for inverse problems. Held 2-day short course.

2017 **Stanford**, Palo Alto, USA.
3 days. Collaboration on Spectral CT with Mats Persson of the Norbert Pelc group.
Invited seminar: *Learning to Reconstruct: Solving Ill-posed Inverse Problems using Deep Learning*

2017 **University College London**, London, UK.
3 days. Collaboration on 3D learned tomography with Andreas Hauptmann of the Simon Arridge group.
Invited seminar: *Learning to Reconstruct*

2017 **TU Berlin**, Berlin, Germany.
2 days. Presentations and collaborations with Gitta Kutynioks group.

2017 **École polytechnique fédérale de Lausanne**, Lausanne, Switzerland.
3 days. Presentations and collaborations with Michael Unsers group.

2016 **Centrum Wiskunde & Informatica**, Amsterdam, Netherlands.
1 Week. Presentations and collaborations with Joost Batenburgs group.

Teaching Experience

Supervision

2018 **Kenneth Lau**, *Masters Thesis*, Co-supervisor.
Representation Learning on Brain MR Images for Tumor Segmentation

2016 **Awais Ashfaq**, *Masters Thesis*, Supervisor.
Segmentation of Cone Beam CT in Stereotactic Radiosurgery

2015 **Simon Hössjer**, *Masters Thesis*, Supervisor.
3D/2D Image Registration for Patient Positioning in Stereotactic Radiosurgery

2015 **Jennie Falk**, *Masters Thesis*, Co-supervisor.
Robust Optimization for Uncertain Radiobiological Parameters in Inverse Dose Planning

Courses

2018 **Mathematics of Deep Learning**, *organizer*, Stockholm, Sweden.
Internal education at Elekta during the spring, $\approx$ 20 attendants.

2018 **Mathematics of Deep Learning with an emphasis on inverse problems**, *co-organizer*, Göttingen, Germany.
2-day mini-course, $\approx$ 30 attendants.

2017 **Signal reconstruction with ODL with emphasis on deep learning**, *co-organizer*, Stockholm, Sweden.
4-day minicourse, 40 attendants from 6 countries.

2017 **Scientific Python**, *organizer*, Stockholm, Sweden.
Internal education at Elekta during the spring, $\approx$ 20 attendants.