Jacquelyn A. Shelton

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Citizenship: USA

Education

Technische Universität Berlin,
Dr. rer. nat. (PhD equivalent), Computer Science, 6.2018

- Advisor: Jörg Lücke
- Supervisor: Klaus-Robert Müller
- Comittee: Matthew Blaschko, Jörg Lücke, Klaus-Robert Müller, Manfred Opper
- Thesis: Large-scale Approximate EM-style Learning and Inference in Generative Graphical Models for Sparse Coding
- Group: Machine Learning and Intelligent Data Analysis

Frankfurt Institute for Advanced Studies,
Researcher, Computer Science, 10.2010 – 2013

- Advisor: Jörg Lücke
- Group: Machine Learning and Computational Neuroscience
- Reviewer: IEEE-Transactions on Pattern Analysis and Machine Intelligence (TPAMI, NIPS, and IEEE-Transactions on Knowledge and Data Engineering (TKDE)

Eberhard Karls Universität Tübingen,
M.Sc., Computer Science, 8.2010

- Advisors: Matthew Blaschko, Christoph Lampert, Andreas Bartels
- Thesis: Semi-supervised Subspace Learning and Application to Human Functional Magnetic Brain Resonance Imaging Data
- Conducted at Max Planck Institute for Biological Cybernetics, Dept. Schölkopf, Impirical Inference, *now the Max Planck Institute for Intelligent Systems*
- Minor in Psychology

Cornell University

- Graduate Research Assistant, Psychology Department, Field Computational Neuroscience Lab, 4.2006 – 9.2006
- Teaching Assistant, College of Arts and Sciences, 1.2006 – 4.2007
- Teaching Assistant, College of Life Science, 8.2005 – 12.2005

University of Michigan–Flint,
B.S., Experimental Psychology, 8.2005

- with Honors
- Minor in Computer Science

Publications

Polewski, P., Shelton, J., Yao, W., and Heurich, M.: Segmenting objects with Bayesian fusion of active contour models and convnet priors. ¡*Under review.*

Shelton, J. A., Robel, A. A., Hoffman, M., and Price, S.: *Generating new realizations of large-scale climate ensembles with conditional variational autoencoders.* American Geophysical Union (AGU), Fall Meeting, (12 2024).

Shelton, J. A., Robel, A. A., Hoffman, M., and Price, S.: *Decomposing Antarctic Subshelf Melt Variability using Generalized Clustering with Kernel Embeddings.* American Geophysical Union (AGU), Fall Meeting, (12 2023).

Shelton, J. A., Robel, A. A., Hoffman, M., and Price, S.: *Generating Antarctic Subshelf Melt Using Recurrent Neural Network-based Generative Adversarial Networks on Spatiotemporal Pixel Clusters.* American Geophysical Union, Fall Meeting 2022, 2022.

Shelton, J. A., Robel, A. A., Hoffman, M., and Price, S.: *Generating Antarctic subshelf melt using recurrent neural network-based Generative Adversarial Models on pixel clusters.* Machine Learning for Polar Regions Workshop, 2022.

Shelton, J. A., Robel, A. A., Hoffman, M., and Price, S.: *Towards generating stationary realizations of simulated Antarctic ice shelf melt rates from limited model output.* Climate Informatics, 2022.

Shelton, J., Polewski, P., Yao, W., and Heurich, M.: *A hybrid convolutional neural network/active contour approach to segmenting dead trees in aerial imagery.* NeurIPS workshop on Tackling Climate Change with Machine Learning, Virtual Worldwide (12 2021).

Polewski, P., Shelton, J., Yao, W., and Heurich, M.: *Instance segmentation of fallen trees in aerial color infrared imagery using active multi-contour evolution with fully convolutional network-based intensity priors.* ISPRS Journal of Photogrammetry and Remote Sensing, (178): 297–313, 2021.

Shelton, J., Polewski, P., Yao, W.: *U-Net for Learning and Inference of Dense Representation of Multiple Air Pollutants From Satellite Imagery.* Climate Informatics, Virtual Worldwide (9 2020). *Selected for Highlight talk.*

Shelton, J., Polewski, P., Yao, W.: *In the Danger Zone: U-Net Driven Quantile Regression can Predict High-risk SARS-CoV-2 Regions via Pollutant Particulate Matter and Satellite Imagery.* International Conference on Machine Learning (ICML) Workshop on Healthcare Systems, Population Health, and the Role of Health-Tech, Virtual Worldwide (7 2020).

Polewski, P., Shelton, J., Yao, W., and Heurich, M.: *Segmentation of single standing dead trees in high-resolution aerial imagery with generative adversial network-based shape priors.* International Arch. Photogramm. Remote Sensing Spatial Inf. Sci., XLIII-B2-2020: 717–723, 2020.

Shelton, J. A., Gasthaus, J., Dai, Z., Lücke, J, and Gretton, A.: *GP-select: Accelerating EM using adaptive subspace preselection*. Neural Computation 29(8):2177–2202, 2017.

Shelton, J. A., Sheikh, A-S., Bornschein, J., Sterne, P., and Lücke, J: *Nonlinear spike-and-slab sparse coding for interpretable image encoding*. PLOS ONE, May 08, 2015.

Shelton, J. A., Gasthaus, J., Dai, Z., Lücke, J, and Gretton, A.: *GP-select: Accelerating EM using adaptive subspace preselection.* Women in Machine Learning Workshop in conjunction with NIPS, 2014.

Sheikh, A-S., Shelton, J. A., and Lücke, J: *A Truncated EM Approach for Spike-and-Slab Sparse Coding*. Journal of Machine Learning Research (JMLR), 15:2653-2687, 2014.

Shelton, J. and Lampert, C.: *Approximate Inference with ϵ-insensitive Marginal Loss.* Women in Machine Learning Workshop in conjunction with NIPS, 2013.

Lücke, J., Shelton, J., Bornschein, J., Sterne, P., Berkes, P., and Sheikh, A-S: *Combining Feed-Forward Processing and Sampling for Neurally Plausible Encoding Models*. Cosyne, 2013.

Shelton, J.A., Sterne, P., J. Bornschein, A.-S. Sheikh, and J. Lücke: *Why MCA? Nonlinear sparse coding with spike-and-slab prior for neurally plausible image encoding*. Proceedings of the Twenty-Sixth Annual Conference on Neural Information Processing Systems, (NIPS 2012).

Shelton, J.A., J. Bornschein, A.-S. Sheikh, P. Berkes, and Lücke, J. *Select and Sample — A Model of Efficient Neural Inference and Learning*. Proceedings of the Twenty-Fifth Annual Conference on Neural Information Processing Systems, (NIPS 2011).

Dai, Z., Shelton, J., Bornschein, J., Sheikh, A. S., and Lücke, J. *Combining approximate inference methods for efficient learning on large computer clusters*. NIPS'11 workshop on Big Learning: Algorithms, Systems, and Tools for Learning at Scale, 2011.

Bornschein, J., Shelton, J. A., Sheikh, A. S., and Lücke, J. *The Maximal Causes of Binary Data*. Bernstein Conference on Comp. Neuroscience (BCCN), 2011.

Blaschko, M., Shelton, J., Bartels, A., Lampert, C., H., and Gretton, A. *Semi-supervised Kernel Canonical Correlation Analysis with Application to human fMRI.* Pattern Recognition Letters, 32(11):1572-1583, 2011.

Shelton, J. A., Blaschko, M. B., Gretton, A., Müller, J., Fischer, E., and Bartels, A.: *Similarities in Resting State and Feature-driven Activity: Non-parametric Evaluation of Human fMRI*. NIPS Workshop on Learning and Planning from Batch Time Series Data, 2010.

Blaschko, M., Shelton, J., and Bartels, A. *Augmenting Feature-driven fMRI Analyses: Semi-supervised learning and resting state activity.* Proceedings of the Twenty-Third Annual Conference on Neural Information Processing Systems (NIPS 2009).

Shelton, J., Blaschko, M., Lampert, C. H., and Bartels, A. *Semi-supervised Analysis of Human fMRI data*, Berlin Brain Computer Interface Workshop on Advances in Neurotechnology, July 2009.

Shelton, J., Blaschko, M., and Bartels, A. *Semi-supervised subspace analysis of human functional magnetic resonance imaging data*, Max Planck Institute Tech Report, (185), May 2009.

Invited Talks

- Probabilistic machine learning for uncertainty representation and applications to neural coding in biological sensory systems.
  International Conference on Mathematical Modeling and Analysis of Populations in Biological Systems (10 2022).
  University of Lousiana, Lafayette, USA.
- Probabilistic Machine Learning, Bayesian Inference, and Remote Sensing for Environmental Data.

Statistical Models and Learning Methods in Wildfire Science (7 2022).
Society for Industrial and Applied Mathematics (SIAM) Conference on Mathematics of Planet Earth, Pittsburgh, USA.

- Deep learning and energy models for fine dead wood segmentation.
  Machine Learning for Climate Conference 2021.
  University of California, Santa Barbara, Kavli Institute for Theoretical Physics, California, USA.
- U-Net For Learning And Inference Of Dense Representation Of Multiple Air Pollutants From Satellite Imagery.
  Climate Informatics 2020, (Worldwide), (9 2020). *Highlight talk.*
- Lecture series on Probabilistic Machine Learning and Bayesian Reasoning
  Data Science Retreat, Berlin, Germany, (2014 and 2015).
- Select and Sample - A Model of Efficient Neural Inference and Learning.
  - *Technical University Darmstadt*, Darmstadt, Germany, (6 2012).
  - *Institute for Science and Technology (IST) Austria*, Vienna, Austria, (2 2012).
  - *Radbound University Nijmegen*, Nijmegen, Netherlands, (1 2012).
- Semi-supervised Kernel Canonical Correlation Analysis of Human fMRI Data
  Women in Machine Learning Workshop, held in conjunction with NIPS. (12 2009).

Employment

- Hong Kong Polytechnic University, Hong Kong
  Post Doctoral Researcher, Department of Land Surveying and Geo-Informatics, 3D Geospatial Vision Group, Prof. Dr. Wei Yao, 11.2019 – **present**
- TomTom, Berlin
  Develop machine learning methods and models for geospatial data, Artifical Intelligence Geospatial Research Group, 10.2018 – 10.2019
- Data Science Retreat, Berlin
  Lecture series on Bayesian Reasoning and Probabilistic Modelling, 2014 – 2015
- Max Planck Institute for Intelligent Systems, Germany
  Hilfswissenschaftler (Research Assistant), Department of Empirical Inference, Prof. Dr. Schölkopf, 5.2009 – 8.2010
  Hilfswissenschaftler (Research Assistant), Department of Psychophysics, Prof. Dr. Bühltoff, 8.2007 – 10.2007
- Cornell University, Ithaca, NY
  Teaching Assistantship, College of Arts and Sciences, 1.2006 – 4.2007
  Teaching Assistantship, College of Life Science, 8.2005 – 12.2005
- University of Michigan-Flint, Flint, MI
  Tutor: Statistics, Experimental psychology, Research methods, 2003 –2005
  Research Assistant to Prof. Dr. T. William Altermatt, 2002 – 2005
  Computer Lab Assistant, 2002 – 2005

Research Internships

- Institute of Science and Technology Austria, 3.2013 – 6.2013
  Computer Vision and Machine Learning – Prof. Dr. Christoph Lampert
  Project on efficient inference using Gibbs sampling in undirected graphs
- Gatsby Computational Neuroscience Unit, 10.2011 – 1.2012
  with Prof. Dr. Arthur Gretton
  Project on accelerating EM using adaptive subspace preselection

- Eberhard Karls Universität Tübingen, 6.2008 – 12.2008
  Graphical Interactive Systems Department – Prof. Dr. Strasser
  Project on spatial-temporal induced boundaries
- Cornell University, Ithaca, NY, 1.2006 – 4.2007
  Field (Vision Science) Lab – Prof. Dr. David J. Field
  Project on statistics of natural images
- University of California, Santa Barbara, CA, 4.2004 – 6.2004
  Research Center for Virtual Environments and Behavior – Prof. Dr. Jim Blascovich
  Undergraduate Honors Thesis on perception in virtual environments

Community Participation

- Chair: European Conference on Machine Learning (ECML) 2021 session on Generative Models
- Judge: Outstanding Student Presentation Award during American Geophysical Union (AGU) Fall Meeting 2022
- Reviewer: NeurIPS, Artificial Intelligence and Statistics (AISTATS), IEEE-TPAMI, IEEE-TKDE, Environmental Data Science, Climate Informatics
- Teaching: Data Science retreat, 2014 and 2015, Berlin, Germany;
  Teaching Assistant, 2005, 2006, and 2007, Cornell University, Ithaca, New York

Scholarships and Awards

- Women in Machine Learning, travel grant for conference attendance
  Six consecutive years for Neural Information Processing Systems (NIPS): 2014, 2013, 2012, 2011, 2010, 2009
- European Network of Excellence PASCAL (Pattern Analysis, Statistical modelling and ComputAtional Learning), travel grant for PASCAL2 Machine Learning Bootcamp (2010)
- Advanced Computing Machines (ACM), grant for women in computing for conference attendance (NIPS 2009)
- National Geospatial Intelligence Agency, grant for satellite image analysis
  Cornell University, Graduate Research Assistantship, Summer 2006
- National Science Foundation Graduate Research Fellowship
  Honorable Mention, 2006
- National Science Foundation Graduate Research Fellowship
  Honorable Mention, 2005
  Start-up grant, Partnership for Advanced Computational Infrastructure facility
- Raphelson Prize, University of Michigan–Flint, 2004
- Psi Chi Summer Research Grant, 2004
- Frances Frazier Student Travel Grant, University of Michigan–Flint, 2004
- Honors Off-Campus Study Grant, University of Michigan-Flint, 2004
- Office of Research Annual Fund Grant, University of Michigan–Flint, 2004
- Undergraduate and Graduate Research, Scholarly and Creative Activity Grant, University of Michigan-Flint, 2004
- Harold and Agape Kallis Scholarship, University of Michigan-Flint, 2004
- Honors Scholar Program Scholarship, University of Michigan-Flint, 2003 – 2005
- Freeman Distance Learning Scholarship, University of Michigan-Flint, 2003 – 2005
- Freeman Psychology Scholarship, University of Michigan-Flint, 2003 – 2005
- MEAP (Michigan Educational Assessment Program) Scholarship, 2001

Languages

- English, Native
- German, Professional fluency

References

- Prof. Dr. Andreas Bartels
  Department of Neurophysiology, Max Planck Institute for Biological Cybernetics, Tübingen, Germany
  Centre for Integrative Neuroscience, Universität Tübingen, Germany
  Email: andreas.bartels@tuebingen.mpg.de
- Prof. Dr. Matthew Blaschko
  Center for Processing Speech & Images, KU Leuven, Leuven, Belgium
  Email: matthew.blaschko@esat.kuleuven.be
- Prof. Dr. Arthur Gretton
  Gatsby Computational Neuroscience Unit, University College London, UK
  Machine Learning Department, Carnegie Mellon University, USA
  Department of Empirical Inference, Max Planck Institute for Intelligent Systems, Germany
  Email: arthur.gretton@gmail.com
- Prof. Dr. Christoph H. Lampert
  Department of Computer Vision and Machine Learning, Institute for Science and Technology Vienna, Austria
  Email: chl@ist.ac.at
- Prof. Dr. Jörg Lücke
  Arbeitsgruppe Machine Learning und Exzellenzcluster Hearing4all
  Department für Medizinische Physik und Akustilk, Universität Oldenburg, Germany
  Email: joerg.luecke@uni-oldenburg.de
- Prof. Dr. Klaus-Robert Müller
  Machine Learning Group, Department of Software Engineering and Theoretical Computer Science
  Technical University of Berlin, Germany
  Email: klaus-robert.mueller@tu-berlin.de
- Prof. Dr. Alex Robel
  Ice and Climate Group, School of Earth & Atmospheric Sciences
  Georgia Institute of Technology
  Email: robel@eas.gatech.edu
- Prof. Dr. Bernhard Schölkopf
  Department of Empirical Inference, Max Planck Institute for Intelligent Systems, Tübingen, Germany
  Email: bs@tuebingen.mpg.de
- Prof. Dr. Wei Yao
  Department of Land Surveying and Geo-Informatics, Hong Kong Polytechnic University, Hong Kong
  Email: wei.hn.yao@polyu.edu.hk