Armeen Taeb

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Research Interests

Graphical models, causal inference, latent-variable modeling, selective inference, mathematical optimization, high-dimensional statistics, applications of data science

Academic positions

2022- **Assistant Professor, Department of Statistics**, University of Washington
2019-2022 **Foundations of Data Science Postdoctoral Associate, mentored by Peter Bühlmann**, ETH

Professional positions

2017 **Data science intern**, Yahoo Inc.
2015 **Data science intern**, Jet Propulsion Laboratory, NASA
2012 **DSP Research intern: Baraniuk lab**, Rice University
2010-2011 **DSP Research intern: Hughes lab**, CU Boulder
2010 **Summer intern**, National Institute of Standards and Technology

Education

California Institute of Technology *Pasadena, CA*
PhD, Electrical Engineering *2015 - 2019*
◇ Advisor: Dr. Venkat Chandrasekaran

California Institute of Technology *Pasadena, CA*
M.S. in Electrical Engineering *2013 - 2015*

University of Colorado at Boulder *Boulder, CO*
B.S. in Electrical Engineering and Applied Mathematics *2009 - 2013*

Awards and Honors

2019-2021 **Foundations of Data Science Postdoctoral Fellowship**, ETH
2020 **W. P. Carey & Co. Prize for outstanding thesis in Applied Mathematics**, Caltech
2016-2018 **Resnick Institute Fellowship for Sustainability Research**, Caltech
2013-2014 **Electrical Engineering Graduate Fellowship**, Caltech
2013 **GRFP Honorable Mention**, NSF
2013 **Distinguished Senior in Electrical Engineering**, University of Colorado at Boulder

Publications

Preprint

D. Sanz-Alonso, A. Stuart, and **A. Taeb**, "Inverse problems and data assimilation with applications to machine learning"
◇ 2022 – arXiv 1810.06191

A. Taeb, N. Ruggeri, C. Schnuck, F. Yang, "Provable concept learning for interpretable predictions using variational inference"
- ◇ 2022 – arXiv 2204.00492

M. Azadkia, **A. Taeb**, P. Bülhmann, "A fast non-parametric approach for local causal structure learning"
- ◇ 2022 – arXiv 2111.14969

A. Taeb, J. Gamella, C. Heinze-Deml, P. Bülhmann, "Perturbations and causality in Gaussian latent variable models"
- ◇ 2022 – arXiv 2101.06950

A. Taeb, P. Shah, and V. Chandrasekaran, "Learning exponential family graphical models with latent variables using regularized conditional likelihood"
- ◇ 2020 – arXiv 2010.09386

Journal Publications

Y., Chen, **A. Taeb**, and P. Bühlmann, "A look at robustness and stability of ℓ_1 vs. ℓ_0 regularization: discussion of papers by Bertsimas et al. and Hastie et al."
- ◇ 2020 – Statistical Science

A. Taeb, P. Shah, and V. Chandrasekaran, "False discovery and its control in low-rank estimation"
- ◇ 2020 – Journal of Royal Statistical Society, Series B

A. Taeb, P. Shah, and V. Chandrasekaran, "Interpreting latent variables in factor models via convex optimization"
- ◇ 2018 – Mathematical Programming

A. Taeb, J. Reager, M. Turmon, and V. Chandrasekaran, "A statistical graphical model of the California reservoir network"
- ◇ 2017 – Water Resources Research

H. Qi, **A. Taeb**, and S. Hughes, "Visual stylometry using background selection and wavelet- HMT-based Fisher Information distances for attribution and dating of impressionist paintings"
- ◇ 2012 – EURASIP Signal Processing

PhD thesis

"Latent-variable modeling: inference, algorithms, and applications"
- ◇ 2019 – W. P. Carey & Co. Prize for outstanding thesis in Applied Mathematics

Conference proceedings

A. Taeb, A. Maleki, C. Studer, and R. Baraniuk, "Maximin analysis of message passing algorithms for block sparse signals"
- ◇ 2013 – Signal Processing with Adaptive Sparse Structured Representations (SPARS)

Grants

with Fanny Yang, Julia Vogt, and Eze Ozkan, "Interpretable predictions for medical imaging diagnostics"
- ◇ 2021-2023; Hasler Foundations, Switzerland; CHF 510k

Teaching and Mentoring

Teaching

Fall 2020	**Seminar on Multiple Testing for Modern Data Science**, Co-Instructor (with Matthias Löffler)	*ETH*
Fall 2018	**Inverse Problems** & **Data Assimilation**, Co-instructor (with Andrew Stuart)	*UDSI*
Spring 2017	**Inverse Problems** & **Data Assimilation**, Graduate Teaching Assistant (TA Rating: 4.5/5.0)	*Caltech*
Fall 2017	**Mathematical Statistics**, Graduate Teaching Assistant (TA Rating: 4.7/5.0)	*Caltech*
Fall 2016	**Mathematical Optimization**, Graduate Teaching Assistant (TA Rating: 4.5/5.0)	*Caltech*

Mentoring

2022	**Felix Hafenmair** , "High-dimensional consistency guarantees for causal structure learning with unknown interventions" – MS in Applied Mathematics, ETH
2022	**Zipei Geng** , "Nonparametric Variable Selection under Latent Confounding" – MS in Statistics, ETH
2021	**Carina Schnuck**, "Provably learning interpretable and predictive latent features" – MS in Statistics, ETH
2020-2021	**Juan Gamella**, "Active learning for causal inference" – MS in Math, ETH
2020-	**Dennis Frauen** , "Inference with highly correlated variables" – M.S. in Math, Göttingen
2020	**Judy Beestermoeller**, "Learning Gaussian graphical models" – M.S. in CS, ETH
2020	**Mattias Hemming**, "Causal inference and low-rank estimation" – M.S. in Statistics, ETH

Invited Talks

"Causal structure learning with unknown noise interventions"

- ◇ University of Washington, Department of Statistics, October 2022
- ◇ COMPSTAT, August 2022

"Perturbations and Causality in Gaussian Latent Variable Models"

- ◇ CMStatistics, December 2021
- ◇ Online Causal Inference Seminar, June 2021
- ◇ SIAM Conference on Algebraic Geometry, August 2021
- ◇ SIAM Conference on Optimization, July 2021
- ◇ Seminar for Statistics and Data Science, TU Münich, March 2021

"False discovery and its control in low-rank estimation"

- ◇ SIAM Conference on Optimization, May 2021
- ◇ Statistics@UPF Seminars, March 2020
- ◇ SIAM Conference of Algebraic Geometry, June 2019
- ◇ Department of Computer Science, Northeastern, December 2018
- ◇ Laboratory for Information and Decision Systems, MIT, November 2018
- ◇ Workshop on New Signal Models and their Information Content, Banff, November 2018
- ◇ Statistics Seminar, University of Chicago, October 2018
- ◇ Seminar For Statistics: ETH Zürich, September 2018

"From Data Science to Hydrology, California Reservoirs During Drought"

- ◇ Wonderful Company HQ, July 2018
- ◇ RAND Corporation, June 2018
- ◇ International Congress on Environmental Modelling and Software, May 2018
- ◇ San Francisco Water Public Utilities Commission, March 2018

"Interpreting latent variables via convex optimization"

- ◇ Allerton Conference on Communication, Control, and Computing, October 2017
- ◇ SIAM Optimization, May 2017

Service & Leadership Experience

Service and Outreach

2020- **Co-organizer: Young Data Science Seminar Zürich**, Organize talks from young researchers

2018-2019 **Area director: toastmasters**, Work with members to cultivate high quality meetings

2014-2016 **Caltech YMCA Tutor**, Mentor high school students in maths and sciences

Peer Review

Statistics journals: Annals of Statistics, Bernoulli, Biometrika, Electronic Journal of Statistics, Journal of American Statistical Association, SIAM Journal of Mathematics of Data Science, Statistical Science

Conferences: Neurips, UAI