

Christian A. Naesseth

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Academic Positions

Assistant Professor <i>Amsterdam Machine Learning Lab</i> <i>Research Interests:</i> Approximate statistical inference, causality and artificial intelligence as well as their application to the sciences	University of Amsterdam 2022 Jan–
Postdoctoral Research Scientist <i>Data Science Institute</i> <i>Mentor:</i> Prof. David Blei <i>Topic:</i> Approximate Bayesian inference, causal inference and machine learning	Columbia University 2019 Aug–2021 Dec
Postdoctoral Researcher <i>Department of Computer and Information Science</i> <i>Mentor:</i> Dr. Fredrik Lindsten <i>Topic:</i> Computational statistics, Monte Carlo methods, and variational methods	Linköping University 2019 Jan–Jul
Research Intern <i>Machine Intelligence & Perception</i> <i>Host:</i> Dr. Sebastian Nowozin <i>Topic:</i> Projekt Tokyo - Visual agent technology to help people who are blind or low vision	Microsoft Research Ltd 2018 Apr–Jul
Fulbright Visiting Student Researcher <i>Data Science Institute</i> <i>Host:</i> Prof. David Blei <i>Topic:</i> Variational and Monte Carlo methods	Columbia University 2016 Jul–2017 Jun
Visiting PhD Student <i>Department of Engineering Science</i> <i>Host:</i> Dr. Frank Wood <i>Topic:</i> Probabilistic programming and computational statistics	University of Oxford 2015 Oct
Teaching Assistant <i>Department of Electrical Engineering, Department of Mathematics</i>	Linköping University 2011 Aug–2018 Dec

Academic Degrees and Education

Ph.D., Electrical Engineering Thesis: Machine learning using approximate inference: Variational and SMC methods Advisors: Dr. Fredrik Lindsten, Prof. Thomas Schön	Linköping University 2019 Jan
M.Sc., Applied Physics and Electrical Engineering Thesis: Vision and Radar Sensor Fusion for Advanced Driver Assistance Systems	Linköping University 2013 Jun
B.Sc., Mathematics Thesis: Nowcasting using Microblog Data	Linköping University 2012 Aug
Exchange Program, Electrical Engineering	Beijing Institute of Technology 2010 Aug–2011 Jun
Chinese Language Studies	Shanghai Jiaotong University 2008 Aug–2010 Jan

Honors, Awards and Grants

Savage Award <i>International Society for Bayesian Analysis (ISBA)</i> Awarded for Outstanding dissertation in Theory and Methods: <i>Machine learning using approximate inference: Variational and sequential Monte Carlo methods.</i>	2019
Best Reviewer Award <i>Neural Information Processing Systems (NeurIPS)</i>	2017

Best Paper Award

20th International Conference on Artificial Intelligence and Statistics (AISTATS) 2017
Awarded for the paper *Reparameterization Gradients through Acceptance–Rejection Algorithms*.

Fulbright Scholarship

Fulbright Commission 2016
Fulbright scholarship to study and do research in USA, awarded based on academic excellence and leadership potential.

Research Scholarships

Ericsson Research Foundation, Gålostiftelsen, Bernt Järmarks stiftelse 2016
Research grants (3) to support research visit to Columbia University, USA. Awarded based on academic and research excellence.

Best Poster Award

Summer School on Deep Learning for Image Analysis 2014
Awarded for poster on *Sequential Monte Carlo for Graphical Models*.

Academic Scholarships

Adolf Lindgrens Stiftelse, Kamratshjälpfonden, Teknikföretagens, Anna Whitlocks Minnesfond 2008/2010
Scholarships (6) to study in Asia, selection process based on academic performance.

Publications

- Liyi Zhang, David M. Blei, and Christian A. Naesseth. Transport score climbing: Variational inference using forward KL and adaptive neural transport. *arXiv:2202.01841*, 2022.
- A. K. Moretti, L. Zhang, C. A. Naesseth, H. Venner, D. Blei, and I. Pe'er. Variational combinatorial sequential Monte Carlo methods for Bayesian phylogenetic inference. In *Uncertainty in Artificial Intelligence (UAI)*, 2021.
- C. A. Naesseth, F. Lindsten, and D. Blei. Markovian score climbing: Variational inference with $KL(p||q)$. In *Advances in Neural Information Processing Systems (NeurIPS) 33*, Vancouver, Canada, 2020.
- D. Biderman, C. A. Naesseth, L. Wu, T. Abe, A. C. Mosberger, L. J. Sibener, R. M. Costa, J. Murray, and J. Cunningham. Inverse articulated-body dynamics from video via variational sequential Monte Carlo. In *First workshop on differentiable computer vision, graphics, and physics in machine learning (NeurIPS)*, Vancouver, Canada, 2020.
- M. Lindfors, T. Chen, and C. A. Naesseth. Robust Gaussian process regression with G-confluent likelihood. In *21th IFAC World Congress*, Germany, 2020.
- C. A. Naesseth, F. Lindsten, and T. B. Schön. Elements of sequential Monte Carlo. *Foundations and Trends® in Machine Learning*, 12(3):307–392, November 2019a. Now Publishers, Inc.
- C. A. Naesseth, F. Lindsten, and T. B. Schön. High-dimensional filtering using nested sequential Monte Carlo. *IEEE Transactions on Signal Processing*, 67(16):4177–4188, August 2019b.
- C. A. Naesseth. *Machine learning using approximate inference: Variational and sequential Monte Carlo methods*. PhD thesis, Linköping University, 2018. **(Savage Award for outstanding dissertation in Theory and Methods)**.
- D. Lawson, G. Tucker, C. A. Naesseth, C. J. Maddison, R. P. Adams, and Y. W. Teh. Twisted variational sequential Monte Carlo. In *Third workshop on Bayesian Deep Learning (NeurIPS)*, Montreal, Canada, 2018.
- C. A. Naesseth, S. W. Linderman, R. Ranganath, and D. M. Blei. Variational sequential Monte Carlo. In *Proceedings of the 21st International Conference on Artificial Intelligence and Statistics (AISTATS)*, Lanzarote, Spain, Apr 2018.
- C. A. Naesseth, F. J. R. Ruiz, S. W. Linderman, and D. M. Blei. Reparameterization gradients through acceptance–rejection algorithms. In *Proceedings of the 20th International Conference on*

Artificial Intelligence and Statistics (AISTATS), Fort Lauderdale, USA, Apr 2017. **(Best Paper Award)**.

- F. Lindsten, A. M. Johansen, C. A. Naesseth, B. Kirkpatrick, T. B. Schön, J. Aston, and A. Bouchard-Côté. Divide-and-conquer with sequential Monte Carlo. *Journal of Computational and Graphical Statistics*, 2016.
- T. Rainforth*, C. A. Naesseth*, F. Lindsten, B. Paige, J-W. van de Meent, A. Doucet, and F. Wood. Interacting particle Markov chain Monte Carlo. In *Proceedings of the 33rd International Conference on Machine Learning (ICML)*, New York, USA, Jun 2016. * equal contribution.
- C. A. Naesseth, F. Lindsten, and T. B. Schön. Towards automated sequential Monte Carlo methods for probabilistic graphical models. In *NIPS Workshop on Black Box Learning and Inference*, Montreal, Canada, 2015a.
- T. B. Schön, F. Lindsten, J. Dahlin, J. Wågberg, C. A. Naesseth, A. Svensson, and L. Dai. Sequential Monte Carlo Methods for System Identification. In *Proceedings of the 17th IFAC Symposium on System Identification (SYSID)*, Beijing, China, 2015.
- C. A. Naesseth, F. Lindsten, and T. B. Schön. Nested Sequential Monte Carlo Methods. In *Proceedings of the 32nd International Conference on Machine Learning (ICML)*, Lille, France, Jul 2015b.
- C. A. Naesseth, F. Lindsten, and T. B. Schön. Sequential Monte Carlo for Graphical Models. In *Advances in Neural Information Processing Systems (NIPS) 27*, pages 1862–1870. Montreal, Canada, 2014a.
- C. A. Naesseth, F. Lindsten, and T. B. Schön. Capacity estimation of two-dimensional channels using sequential Monte Carlo. In *Proceedings of the 2014 IEEE Information Theory Workshop (ITW)*, pages 431–435, Hobart, Australia, Nov 2014b.

Invited Talks

Monte Carlo and Variational Methods: Bridging the Gap	ESSEC Paris
<i>Workshop on Monte Carlo and Approximate Dynamic Programming Methods</i>	2022 Aug
Variational Bayes Goes to Monte Carlo	University of Amsterdam
<i>Amsterdam Machine Learning lab (seminar)</i>	2021 May
Machine learning using approximate inference	Joint Statistical Meeting
<i>Savage Award session (contributed talk)</i>	2020 Aug
Machine learning using approximate inference	Bocconi University
<i>Junior Bayes Beyond the Borders (webinar)</i>	2020 Jul
Variational and Monte Carlo methods – Bridging the Gap	KTH
<i>Center for Industrial and Applied Mathematics (seminar)</i>	2019 Feb
Variational and Monte Carlo methods – Bridging the Gap	Chalmers
<i>Department of Mathematical Sciences (seminar)</i>	2019 Jan
Variational inference	Uppsala University
<i>Department of Information Technology (tutorial)</i>	2018 Feb
Approximate Bayesian inference: Variational and MC methods	Linköping University
<i>Department of Computer Science (seminar)</i>	2017 Nov
Monte Carlo methods and proper weighting	The University of Oxford
<i>Department of Engineering Science (tutorial)</i>	2015 Oct
Nested Sequential Monte Carlo Methods	ENSAE Paris
<i>SMC Workshop</i>	2015 Aug
Sequential Monte Carlo for Probabilistic Graphical Models	University of NSW
<i>School of Mathematics and Statistics (seminar)</i>	2014 Oct

Professional Service

Workflow Chair, International Conference on Artificial Intelligence and Statistics 2022	<i>AISTATS</i>
Area Chair, International Conference on Artificial Intelligence and Statistics 2021	<i>AISTATS</i>
Reviewer, Journal of Machine Learning Research 2020	<i>JMLR</i>
Reviewer, Neural Information Processing Systems 2017, 2018, 2019, 2020	<i>NeurIPS</i>
Reviewer, International Conference on Machine Learning 2017, 2018	<i>ICML</i>
Reviewer, International Conference on Learning Representations 2017	<i>ICLR</i>
Reviewer, International Conference on Artificial Intelligence and Statistics 2017, 2018	<i>AISTATS</i>

Teaching Experience

Experience as a lecturer, recitation instructor, teaching and lab assistant in basic and advanced courses on automatic control, mathematical modeling, simulation, mathematics and signal processing. Completed a first course (6 ECTS) on learning and knowledge in higher education.

Foundations of Graphical Models

Guest lecturer 2019
Ph.D. level, 1 occasion

Sensor Fusion

Recitation instructor, teaching and lab assistant 2015–2016
M.Sc. level, 2 occasions

Digital Signal Processing

Lab assistant 2014
M.Sc. level, 1 occasion

Industrial Control Systems

Recitation instructor, teaching and lab assistant 2014
M.Sc. level, 1 occasion

Control Project Laboratory

Project supervisor 2014–2018
M.Sc. level, 4 occasions

Modeling and Simulation

Recitation instructor, teaching and lab assistant 2013–2015
M.Sc. level, 3 occasions

Engineering Project

Project supervisor 2013
B.Sc. level, 1 occasion

Automatic Control

Recitation instructor, teaching and lab assistant 2012–2014
B.Sc. level, 5 occasions

Foundation Course in Mathematics

Recitation instructor and teaching assistant 2011
B.Sc. level, 1 occasion

Languages

Swedish: Native Proficiency

English: Full Professional Working Proficiency

Chinese: Limited Working Proficiency