CURRICULUM VITAE   WESSEL**BRUINSMA**

ABOUT

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Wessel Bruinsma 🔬
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LANGUAGES

dutch, native
english

INTERESTS

probabilistic modelling with a focus on time series, Bayesian nonparametrics with a focus on Gaussian processes, approximate inference, probabilistic programming, probability theory, and real analysis

EDUCATION

Jan '18 – Jul '22   **PhD in Machine Learning**   Machine Learning Group, U. of Cambridge
   • Supervised by Richard E. Turner

Oct '15 – Sep '16   **MPhil in Machine Learning**   Dept. of Engineering, U. of Cambridge
   • Distinction, class rank 1 / ∼20

Sep '12 – Jul '15   **BSc in Electrical Engineering (Hons)**   EEMCS, Delft U. of Technology
   • Distinction, class rank 1 / ∼100
   • Specialisation in mathematics

PROFESSIONAL HISTORY

Oct '22 – now   **Senior Researcher**   Microsoft Research, Amsterdam

Jul '19 – Sep '19   **Internship (Quantitative Research)**   G-Research, London

Sep '16 – Oct '22   **Machine Learning Researcher**   Invenia Labs Limited, Cambridge
   • Research into modelling multi-output time series, with a focus on electricity markets

Sep '14 – Jul '15   **Technical Specialist**   EEMCS Recruitment Days, Delft
   • Design and implementation of solutions to scheduling problems

Sep '13 – Jul '14   **Electrical Engineer**   TU Delft Solar Boat Team, Delft
   • Design and analysis of a power distribution system
   • Competed in DONG Solar Energy Challenge 2014 and Solar1 Monte Carlo Cup 2014

SELECTED PUBLICATIONS

[link]   Bruinsma W. P., Tegnér M., and Turner R. E. (2022). "Modelling Non-Smooth Signals with Complex Spectral Structure," in *Artificial Intelligence and Statistics (AISTATS), 25th International Conference on*.

[link]   Coker B., Burt D., Bruinsma W. P., Pan W., Doshi–Velez F. (2022). "Wide Mean-Field Bayesian Neural Networks Ignore the Data," in *Artificial Intelligence and Statistics (AISTATS), 25th International Conference on*.

[link]   Gordon, J., Bruinsma W. P., Foong, A. Y. K., Requeima, J., Dubois Y., Turner, R. E. (2020). "Convolutional Conditional Neural Processes," *International Conference on Learning Representations (ICLR), 8th*. (Awarded oral presentation.)

SELECTED SOFTWARE

[link]   *Stheno*: Probabilistic programming with Gaussian processes in Python

[link]   *Plum*: Implementation of multiple dispatch in Python

[link]   *FiniteDifferences.jl*: Estimate derivatives with finite differences in Julia

PUBLICATIONS

[link] Andersson, T. R., Bruinsma, W. P., Markou, S., Requeima, J., Coca-Castro, A., Vaughan, A., Ellis, A.-L., Lazzara, M., Jones, D. C., Hosking, J. S., and Turner R. E. (2022). "Active Learning With Convolutional Gaussian Neural Processes For Environmental Sensor Placement " in *Gaussian Processes, Spatiotemporal Modeling, and Decision-Making Systems (GPSMDS), NeurIPS 2022 Workshop on*.

[link] Lalchand V., Bruinsma W. P., Burt D. R., and Rasmussen, C. E. (2022). "Sparse Gaussian Process Hyperparameters: Optimize or Integrate?" in *Advances in Neural Information Processing Systems (NeurIPS), 36th*.

[link] Rawat A., Requeima J. R., Bruinsma W. P., and Turner R. E. (2022). "Challenges and Pitfalls of Bayesian Unlearning," in *Updatable Machine Learning (UpML), ICML 2022 Workshop on*.

[link] Foong, Y. K., Bruinsma W. P., and Burt D. (2022). "A Note on the Chernoff Bound for Random Variables in the Unit Interval," arXiv:2205.07880.

[link] Bruinsma W. P., Tegnér M., and Turner R. E. (2022). "Modelling Non-Smooth Signals with Complex Spectral Structure," in *Artificial Intelligence and Statistics (AISTATS), 25th International Conference on*.

[link] Coker B., Burt D., Bruinsma W. P., Pan W., Doshi–Velez F. (2022). "Wide Mean-Field Bayesian Neural Networks Ignore the Data," in *Artificial Intelligence and Statistics (AISTATS), 25th International Conference on*.

[link] Markou S., Requeima J. R., Bruinsma W. P., and Turner R. E. (2022). "Practical Conditional Neural Processes Via Tractable Dependent Predictions," in *International Conference on Learning Representations (ICLR), 10th*.

[link] Markou S., Requeima J. R., Bruinsma W. P., and Turner R. E. (2021). "Efficient Gaussian Neural Processes for Regression," in *Uncertainty & Robustness in Deep Learning (UDL), ICML 2021 Workshop on*.

[link] Foong, A. Y. K., Bruinsma W. P., Burt D. R., and Turner R. E. (2021). "How Small can PAC-Bayes be in the Small Data Regime?" in *Advances in Neural Information Processing Systems (NeurIPS), 35th*.

[link] Bruinsma W. P., Requeima J., Foong, A. Y. K., Gordon. J., and Turner R. E. (2021). "The Gaussian Neural Process," in *Advances in Approximate Bayesian Inference (AABI), 3rd Symposium on*. (Awarded contributed talk.)

[link] Xia, R., Bruinsma W. P., Tebbutt W., and Turner R. E. (2021). "The Gaussian Process Latent Autoregressive Model," in *Advances in Approximate Bayesian Inference (AABI), 3rd Symposium on*.

[link] Foong, A. Y. K., Bruinsma W. P., Gordon. J., Dubois, Y., Requeima J., and Turner R. E. (2020). "Meta-Learning Stationary Stochastic Process Prediction with Convolutional Neural Processes," in *Advances in Neural Information Processing Systems (NeurIPS), 33th*.

[link] Bruinsma, W. P., Perim E., Tebbutt W., Hosking J. S., Solin A., Turner R. E. (2020). "Scalable Exact Inference in Multi-Output Gaussian Processes," in *International Conference on Machine Learning (ICML), 37th*.

[link] Gordon, J., Bruinsma W. P., Foong, A. Y. K., Requeima, J., Dubois Y., Turner, R. E. (2020). "Convolutional Conditional Neural Processes," in *International Conference on Learning Representations (ICLR), 8th*. (Awarded oral presentation.)

[link] Berkovich, P., Perim E., Bruinsma W. P. (2019) "GP-ALPS: Automatic Latent Process Selection for Multi-Output Gaussian Process Models," in *Advanced in Approximate Bayesian Inference (AABI), 2nd Symposium on*.

[link] Requiema, J. R., Tebbutt, W. C., Bruinsma, W. P., Turner, R. E. (2019). "The Gaussian Process Autoregressive Regression Model (GPAR)," in *Artificial Intelligence and Statistics (AISTATS), 22nd International Conference on*.

[link] Bruinsma, W. P., Turner, R. E. (2018). "Learning Causally-Generated Time Series," arXiv:1802.08167.

[link] Bosma, S., Bruinsma, W. P., Hes, R. P., Bentum, M. J., and Lager, I. E. (2017). "Grating Lobe Prediction in 3D Array Antennas," in *Antennas and Propagation (EuCAP), 11th European Conference on*.

[link] Bruinsma, W. P., Hes, R. P., Bosma, S., Lager, I. E., and Bentum, M. J. (2016). "Radiation Properties of Moving Constellations of (Nano) Satellites: A Complexity Study," in *Antennas and Propagation (EuCAP), 10th European Conference on*.

[link] Bentum, M. J., Lager, I. E., Bosma, S., Bruinsma, W. P., and Hes, R. P. (2015). "Beamforming in Sparse, Random, 3D Array Antennas with Fluctuating Element Locations," in *Antennas and Propagation (EuCAP), 9th European Conference on*.

AWARDS AND GRANTS

Jan '22	**Christ's College Excellence in Teaching Prize**
2018 – 2021	**International Doctoral Scholarship (IDS) Grant Covering PhD Fees and Stipend**
Mar '16	**UfD – Damen Bachelor Award**

MACHINE LEARNING SOFTWARE

[link] *Stheno*: Probabilistic programming with Gaussian processes in Python

[link] *GPAR*: Implementation of GPAR in Python

[link] *NeuralProcesses.jl*: A framework for composing Neural Processes in Julia

[link] *NeuralProcesses*: A framework for composing Neural Processes in Python

[link] *ConvCNP*: Implementation of the ConvCNP in Python

[link] *GPCM*: Implementation of several variants of the Gaussian Process Convolution Model in Python

[link] *OILMM*: Implementation of the OILMM in Python

[link] *MLKernels*: Flexible implementation of kernels in Python

OTHER SOFTWARE

[link] *Plum*: Implementation of multiple dispatch in Python

[link] *LAB*: A generic interface for linear algebra backends in Python

[link] *FDM*: Estimate derivatives with finite differences in Python

[link] *FiniteDifferences.jl*: Estimate derivatives with finite differences in Julia

[link] *Varz*: Painless optimisation of constrained variables in AutoGrad, TensorFlow, PyTorch, and JAX

[link] *Matrix*: Structured matrices in Python

[link] *Algebra*: Algebraic structures in Python

THESES

[link] Bruinsma W. P. (2022). "Convolutional Conditional Neural Processes." Department of Engineering, University of Cambridge. Thesis for the degree Doctor of Philosophy.

[link] Bruinsma W. P. (2019). "The Generalised Gaussian Process Convolution Model." Department of Engineering, University of Cambridge. Thesis for the degree Master of Philosophy.

[link] Bruinsma, W. P., Hes, R. P., Kroep, H. J. C., Leliveld, T. C., Melching, W. M., and aan de Wiel, T. A. (2015). "An Extensible Toolkit for Real-Time High-Performance Wideband Spectrum Sensing." Faculty of Electrical Engineering, Mathematics and Computer Science, Delft University of Technology. Thesis

for the degree Bachelor of Science.

REVIEWING

GPSMDMS 2022	**Reviewer**
ICML 2022	**Reviewer (top 10%)**
AISTATS 2022	**Reviewer**
ICML 2021	**Reviewer**
NeurIPS 2020	**Reviewer**

TEACHING

All teaching was done at the University of Cambridge.

Easter 2022	**Cosupervisor for two MPhil Projects**	MPhil in Machine Learning and Machine Intelligence
Easter 2021	**Cosupervisor for two MPhil Projects**	MPhil in Machine Learning and Machine Intelligence
Lent 2021	**Supervisor for Inference**	Part IIA, Engineering Tripos
Michaelmas '21	**Supervisor for Introduction to ML**	MPhil in Machine Learning and Machine Intelligence
Easter 2020	**Cosupervisor for MPhil Project**	MPhil in Machine Learning and Machine Intelligence
Lent 2020	**Supervisor for Inference**	Part IIA, Engineering Tripos
Michaelmas '20	**Demonstrator**	AI for the study of Environmental Risks (CDT)
Michaelmas '20	**Demonstrator**	MPhil in Machine Learning and Machine Intelligence
Lent 2019	**Supervisor for Inference**	Part IIA, Engineering Tripos

FULL PORTFOLIO

See wesselb.github.io/publications and wesselb.github.io/software for a full overview of my software, publications, posters, theses, talks, and write-ups.