

Bradley.J Gram-Hansen

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"Life is nothing but an electron looking for a place to rest"

EDUCATION

UNIVERSITY OF OXFORD

PHD IN MACHINE LEARNING AND STATISTICS

Supervisors : Prof Yee Wyhe Teh • Dr Tom Rainforth
Dr Atılım Günes Baydin • Prof Frank Wood •
Prof Phil Torr

Expected completion by Oct 2020 | Oxford, UK

UNIVERSITY OF NOTTINGHAM

MMATH IN MATHEMATICS

BACHELORS IN MATHEMATICAL PHYSICS

2011 - 2015 | Nottingham, UK

Grade: 75% avg over 4 years. First (GPA 4.0)

LINKS

Github:// [bayesianbrad](#)

Google Scholar:// [Publications](#)

LinkedIn:// [bradleygramhansen](#)

Twitter:// [@bayesianbrad](#)

Blog:// [Bradley's Blog](#)

SKILLS

TECHNICAL SKILLS

Statistical Modelling

Machine Learning

Probabilistic Programming

Markov Chain Monte Carlo

Gaussian Processes

Regression

Neural Networks

Deep Learning

Bayesian Inference

Time Series

Differential Equations

Relativity

Analysis

Quantum and Classical Mechanics

Quantum and Classical Information Theory

Linear Algebra

Stochastic Processes

Quantum Field Theory

Mathematical Biology

Non-linear Systems

PROGRAMMING SKILLS

Python • Matlab • Clojure •

C++ • Git • Docker & Singularity • Shell

Linux & UNIX • \LaTeX • HTML

SPECIFIC LIBRARIES

Pytorch • Pyro • Pyprob • Matplotlib • Numpy

Scikit-learn • SciPy • Jupyter Notebook • Many

others

INTERPERSONAL SKILLS

Team player • Patient • Organised

Motivator • Responsible • Adaptive

Hard-working • Good Listener

Observant • Analytical

LANGUAGES

Englsh (Native) • Madarin (Learning)

French (Basic)

REFERENCES

Several available upon request.

EXPERIENCE

OXCSML AND TORR VISION GROUP

RESEARCHER, OCT 2016 – PRESENT

- Designing probabilistic programming languages and interpretable AI systems, with a focus on social and scientific applications, especially for physics-based applications.
- Developed new inference strategies that leverage deep learning frameworks.
- Created a customisable probabilistic programming system for "First-order models", enabling new classes of inference algorithms to be deployed in probabilistic programming systems.
- Developed a framework for overriding any industrial simulator, written in any language and connecting it to a generic probabilistic programming systems to perform statistically correct inference.
- Developed my own framework and algorithm for performing inference on small data-sets with Gaussian Processes.

TECHNICAL CONSULTANT

CONSULTING, JUN 2019 – PRESENT

- I work with several social ventures, ranging from creating localised electricity grids to providing education to children across Africa.
- I offer insights and technical solutions on how to apply statistical analysis and machine learning 'AI' to their problems.
- This role requires me to constantly think outside of the box and deploy unique solutions.

FRONTIER DEVELOPMENT LAB

RESEARCH INTERN, JUN 2018 – OCT 2018

- I designed a state-of-the-art system for generating automated maps of informal settlements from low-resolution satellite imagery. This was the first time any such thing had been done with this type of low-resolution data structure.
- I had to collaborate on this project with the European Space Agency, Oxford University, SA Catapult, NVidia and UNICEF.
- I had to develop methods that were robust to very noisy data.

UNIVERSITY OF NOTTINGHAM

RESEARCH INTERN, JUN 2014 – SEPT 2014

- I worked on developing novel techniques for analysing quantum channels and quantum maps in a relativistic framework using Gaussian states.
- I worked both independently and as part of a small team

INVITED TALKS

- Invited by the UN to give a talk on AI for space at the AI for good global summit. Geneva, CH, 2019
- Invited to the Oxford centre for Human Brain Activity to give a talk on Probabilistic Programming. Oxford, UK, 2018.
- Invited to ESA Esrin to give a talk on using machine learning to detect informal settlements. ESA Esrin, IT, 2018.

AWARDS

ACADEMIC

2019

Runner-up in the Vice-Chancellor's Social Impact Award

2019

NeulPS travel award

2018

FDL Award for Unexpected Discovery

2016-2020

EPSRC Fully-Funded 4-Year PhD Studentship

2014

EPSRC Summer Research Award

2014

BP Ambition Award

2012

Eliahou Dangoor Scholarship

2012

PWC High Flyers Award

2011

Sir Peter Mansfield High Achiever Scholarship

2011-2015

St Ann's Experian Scholarship

2011-2015

First in the Family Scholarship

2010

Excellent Dedication and Contribution A-level Physics

2010

Interest and Enthusiasm A-level Mathematics

SPORTING

2016

IronMan Copenhagen 11th in Age Group

2016

Silver Medal, Fell Running Championships

2005-2007

National mini field youth hockey champion U13 and U15

PUBLICATIONS

PUBLISHED PAPERS

- AG. Baydin, L. Heinrich, W. Bhimji, **B. Gram-Hansen**, G. Louppe, L. Shao, K. Cranmer and F.Wood, **Efficient Probabilistic Inference in the Quest for Physics Beyond the Standard Model** The International Conference on Neural Information Processing Systems (NeurIPS) 2019
- AG. Baydin, L. Heinrich, W. Bhimji, **B. Gram-Hansen**, G. Louppe, L. Shao, K. Cranmer and F.Wood, **Etalumis: Bringing Probabilistic Programming to Scientific Simulators at Scale** The International Conference for High Performance Computing, Networking, Storage, and Analysis (SC) 2019
- **B. Gram-Hansen***, Y. Zhou*, T. Kohn, T. Rainforth, H. Yang and F. Wood, **A Low-Level Probabilistic Programming Language for Non-Differentiable Models** The 22nd International Conference on Artificial Intelligence and Statistics (AISTATS) 2019
- **B. Gram-Hansen***, P. Helber*, I. Varatharajan, F. Azam, A. Coca-Castro, V. Kopackova and P. Bilinski, **Mapping Informal Settlements in Developing Countries using Machine Learning and Low Resolution Multi-spectral Data** The AAAI/ACM Conference on AI Ethics and Society (AAAI) 2018
- **B. Gram-Hansen***, Y. Zhou*, T. Kohn, T. Rainforth, H. Yang and F. Wood, **Hamiltonian Monte Carlo for Probabilistic Programs with Discontinuities** The International Conference on Probabilistic Programming 2018

WORKSHOP PAPERS

- **B. Gram-Hansen***, C. Schroeder de Witt*, P.H.S.Torr, Y.W. Teh, T. Rainforth and AG. Baydin, **Hijacking Malaria Simulators with Probabilistic Programming** AI for Social Good Workshop at the International Conference on Machine Learning (ICML) 2019
- **B. Gram-Hansen**, P. Helber, I. Varatharajan, F. Azam, A. Coca-Castro, V. Kopackova and P. Bilinski, **Generating Material Maps to Map Informal Settlements** Machine Learning for the Developing World Workshop at the 32nd Conference for Neural Information Processing Systems (NeurIPS) 2018
- **B. Gram-Hansen***, C. Schroeder de Witt*, P.H.S.Torr, Y.W. Teh, A. G. Baydin and T. Rainforth, **Efficient Bayesian Inference for Nested Simulators** 2nd Symposium on Advances in Approximate Bayesian Inference (AABI) 2019

PRE-PRINTS

- **B. Gram-Hansen** and S.J Roberts, Multi-layer Stacked Gaussian Processes 2019
- **B. Gram-Hansen**, An investigation into the creation of entanglement mediated by interaction Dissertation 2015
- **B. Gram-Hansen**, An Insight Into: Quantum Random Walks Thesis 2014

REVIEWING DUTIES

- NeurIPS 2019 workshop on Deep Learning for the Physical Sciences
- NeurIPS 2019 main conference
- NeurIPS 2018 workshop on Deep Learning for the Physical Sciences
- NeurIPS 2018 workshop on Critiquing and Correcting Trends in Machine Learning