Bradley **Gram-Hansen**

Projects: https://github.com/bayesianbrad • Email: bradleygramhansen@gmail.com • Publications: Google Scholar

Experience

Dataminr, Inc.
Seattle / Remote, US

AI Research Scientist II Jan 2022 – Present

AI Research Scientist I June 2021 – Dec 2022

- Work with a great team of scientists, engineers, product managers and customer success managers to research, build, and deploy state-of-the-art AI pipelines leveraging multiple data modalities from over 500,000 data sources that are ingested each second for Dataminrs core product.
- I have developed and deployed tens of models into production, which has led to a 30% increase in higher quality alerts, over $300k+ annually in cost savings, and several new product streams for brand risk and cyber security use cases.
- Built a number of custom large language models (LLMs) using pytorch and databricks for cyber and code completion use cases.
- Created A/B testing pipelines using Airflow to monitor operational performance of AI models for model and data drift.
- Conducted multiple annotation tasks using label studio and Amazon turk.
- Built generative AI models for knowledge extraction and knowledge graph ontology creation to detect cyber vulnerabilities in code, and across the dark-web and web.
- Built an AI framework for automating the detection and summarization of trends across the entire web and dark web.
- Perform interviews and supervise research interns on AI projects.

Intelligent Networks
London, UK

Chief Technology Officer & Co-founder June 2020 – June 2021

- Co-founded https://intelligentnetworks.ai, raised seed funding, built the website and the core ML / Deep learning platform, and developed customer relationships.
- Built probabilistic machine learning solutions for our enterprise customers, that reduced false alarm incidents by 96 % and generated a significant ROI of 86%.

University of Oxford
Oxford, UK

Machine Learning Researcher Sept 2016 – Apr 2021

- Created PyLFPPL, an open source compiler built with Python & Clojure to enable new and existing classes of probabilistic graphical models and Bayesian inference algorithms to be deployed in probabilistic programming systems in an automated way via a standard API. Work published at AISTATS.
- Collaborated with teams at CERN, Intel, Oxford University, UBC, Google, and NYU, where I helped to develop two novel open source deep learning and Bayesian modeling tool-kits, PPX and PyProb, using Python, a small amount of C++ & Google FlatBuffers, to convert real-world simulators into probabilistic programs for deep learning inspired statistical inference algorithms. Work published at NeurIPS.
- Created new generative modeling strategies for agent-based models that utilized custom deep learning frameworks based on variational auto-encoders and MCMC algorithms built with Pytorch that provided a 50% increase in statistical efficiency over previous methods. Work published at AABI.
- Developed innovative kernel-based algorithms in Python using GPy with Pandas for forecasting and predicting events in financial and non-financial time-series datasets.

Frontier Development Lab
Oxford & Frascati, UK & IT

Machine learning scientist Jun 2018 – Sept 2018

- Collaborated with Nvidia, NASA, ESA, Google Cloud, and UNICEF and led a team on an ambitious, yet ambiguous, project to detect Informal settlements for UNICEF, using free, low-resolution satellite imagery - it's very blurry! I engineered the prototype and the initial solution that turned spectral signals from satellite images into actionable insights for UNICEF. I used Matlab & Python (GeoPandas).

- Enabled UNICEF to save $100,000 annually in surveying costs
- Invited to present results to industry leaders at the UN AI for social good conference.

Education

University of Oxford Ph.D. in Machine Learning, April 2021

- **Thesis**: Extending Probabilistic Programming Systems and Applying them to Real-World Simulators
    - **Supervisors**: Prof Yee Whye Teh, Dr Tom Rainforth, Dr Atılım Günes Baydin, Prof Philip Torr

University of Nottingham Masters in Mathematics & Physics, July 2015

- **Dissertation:** An Investigation into the Creation of Entanglement Mediated by Interaction.
    - **Supervisor:** Dr Alexander Ossipov
- **Thesis:** Quantum Random Walks
    - **Supervisor:** Prof Mădălin Guţă
- Graduated in top 5%. Equivalent GPA 4.0.

Publications & Pre-prints

Pre-prints

- B. Gram-Hansen, Adam Golinski, C. Schroeder de Witt, P.H.S.Torr, Y.W. Teh, A. G. Baydin and T. Rainforth, *Effective Approximate Inference for Nested Simulator*s, 2021
- B. Gram-Hansen and S.J Roberts, *Multi-layer Stacked Gaussian Processes*, 2021

Published

- Saeid Naderiparizi, Adam Scibior, Andreas Munk, Mehrdad Ghadiri, Atilim Gunes Baydin, **B. Gram-Hansen**, Christian A Schroeder De Witt, Robert Zinkov, Philip Torr, Tom Rainforth, Yee Whye Teh, Frank Wood, *Amortized rejection sampling in universal probabilistic programming,* The 24th International Conference on Artificial Intelligence and Statistics (**AISTATS**), 2022
- **B. Gram-Hansen**, Extending Probabilistic Programming Systems, *Extending probabilistic programming systems and applying them to real-world simulators*, Doctoral Thesis, University of Oxford, 2021
- **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*, The 2nd Symposium on Advances in Approximate Bayesian Inference (**AABI**), 2019
- 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, Nominated for Best Paper.
- **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 Thirty-Third AAAI Conference on Artificial Intelligence (**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*, N.Nardelli, A. Gambardella,R. Zinkov, P. Dokania, Siddharth N. A. B. Espinosa-Gonzalez, Lord A. Darzi, P.H.S. Torr and A. G. Baydin, *Simulation-Based Inference for Global Health Decisions,* 2020, ML for Health Workshop at the International Conference on Machine Learning (**ICML**), 2020
- 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

Invited Talks

Talks

- *Applying probabilistic programming to construct knowledge graphs*, Dataminr, New York (virtual), US, 2021
- *AI for space*, United Nations: AI for good global summit, Geneva, CH, 2019
- *Probabilistic Programming,* Oxford Centre for Human Brain Activity, Oxford, UK, 2018
- *Using machine learning to detect informal settlements*. European Space Agency, IT, 2018

Awards

Academic

- 2020 EY (Ernst & Young) Best Technology Business Award, out of 50 teams
- 2019 Runner-up in the Vice-Chancellor's Social Impact Award, out of 300 people
- 2019 NeulPS Travel Award
- 2018 FDL Award for Unexpected Discovery, out of 30 people
- 2016-2020 EPSRC Fully-Funded 4-Year PhD Studentship, 1 of 10 out of 240 people
- 2014 EPSRC Summer Research Award
- 2014 BP Ambition Award, 1 of 20 out of 600 people
- 2012 Eliahou Dangoor Scholarship, 1 of 5 out of 1000 people
- 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, out of 400 people
- 2016 Silver Medal, Fell Running championships, competing against 150 people
- 2005-2007 National Mini-field Youth Hockey champion U13 and U15 out of 25 teams

Reviewing Duties

- AISTATS 2022 main conference
- Neurlps 2021 main conference
- Neurlps 2020 workshop on Deep Learning for the Physical Sciences
- Neurlps 2020 main conference
- AISTATS 2020 main conference
- Neurlps 2019 workshop on Deep Learning for the Physical Sciences
- Neurlps 2019 main conference
- Neurlps 2018 workshop on Deep Learning for the Physical Sciences
- Neurlps 2018 workshop on Critiquing and Correcting Trends in Machine Learning