Bryn Elesedy

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Education

2018 – 2023 **DPhil Machine Learning** Department of Computer Science, University of Oxford

Thesis: *Symmetry and Generalisation in Machine Learning*

Passed without corrections. Supervised by Varun Kanade and Yee Whye Teh. Interests include symmetry in machine learning, statistical learning theory, theory of deep learning and applications to science. Member of EPSRC CDT in Autonomous Intelligent Machines and Systems. Integrated master's 2018-19.

2011 – 2015 **MSc. Mathematics with Astrophysics** Jesus College, University of Cambridge: 1st

Lecture courses Broad range of mathematics and theoretical physics including probability, algebra, analysis, (differential) geometry, integrable systems, quantum field theory and general relativity.

Master's thesis *Timescales of Galaxy Mergers and Satellite Stripping*: 1st
Computational investigation of galaxy merger time scales and rates of mass accretion.

Experience

08/22 – 12/22 **Research Scientist Intern, DeepMind**
Fundamental research in machine learning, supervised by Marcus Hutter. See preprint 7.

06/21 – 12/21 **AI Resident, X** (formerly Google [x])
Worked with David Duvenaud on machine learning for science.

04/20 – 12/20 **Action Team, Royal Society DELVE Initiative**
Multi-disciplinary team convened by Royal Society to provide data-driven assistance in confronting the COVID pandemic. Results informed decisions at top levels of UK government (SAGE, Cabinet Office). See publications 2 and 3.

01/18 – 05/18 **Quantitative Analyst, Tudor Investment Corporation**
Machine learning and automation in highest performing discretionary team.

06/16 – 01/18 **Quantitative Researcher, Tudor Investment Corporation**
Research, signal construction and portfolio optimisation for systematic (macro) trading.

Skills

- Fluent in `Python` and its data/ML ecosystem, including `NumPy`, `pandas`, `matplotlib`, `scikit-learn` and `JAX`.
- Proficient in `Git`, LaTeX and `Bash`. Basic experience with many tools including `C++`, `MATLAB`, `VBA`, `R`, `PowerShell` and `HTML/CSS`.
- Experienced at working to deadlines and on mission-critical projects. Commercial experience applying machine learning to real world problems.

Publications & Preprints

7. *U-Clip: On-Average Unbiased Stochastic Gradient Clipping*. **Bryn Elesedy**, Marcus Hutter. Under review. link
6. *Group Symmetry in PAC Learning*. **Bryn Elesedy**. Geometrical and Topological Representation Learning Workshop, ICLR 2022 (Spotlight). link
5. *Provably Strict Generalisation Benefit for Invariance in Kernel Methods*. **Bryn Elesedy**. NeurIPS 2021. link
4. *Provably Strict Generalisation Benefit for Equivariant Models*. **Bryn Elesedy** and Sheheryar Zaidi. ICML 2021. link
3. *Efficient Bayesian Inference of Instantaneous Reproduction Numbers at Fine Spatial Scales, with an Application to Mapping and Nowcasting the COVID-19 Epidemic in British Local Authorities*. Yee Whye Teh, Avishkar Bhoopchand, Peter Diggle, **Bryn Elesedy**, Bobby He, Michael Hutchinson, Ulrich Paquet, Jonathan Read, Nenad Tomasev, Sheheryar Zaidi (YWT then alphabetical ordering). Royal Society Special Topic Meeting on R, Local R and Transmission of COVID-19. Website: localcovid.info. link
2. *Effectiveness and resource requirements of test, trace and isolate strategies for COVID in the UK*. Bobby He[*], Sheheryar Zaidi[*], **Bryn Elesedy**[*], Michael Hutchinson[*], Andrei Paleyes, Guy Harling, Anne Johnson, Yee Whye Teh on behalf of Royal Society DELVE group (* equal contribution). Royal Society Open Science, 2021. link
1. *Lottery Tickets in Linear Models: An Analysis of Iterative Magnitude Pruning*. **Bryn Elesedy**, Varun Kanade, Yee Whye Teh. Sparsity in Neural Networks Workshop, 2021. link

Awards

- G-Research PhD Prize, 2nd Place, 2022. £5000.
- Alan Turing Institute Enrichment Scheme Scholarship, 2020. £7000. Cancelled due to pandemic.
- Jesus College Educational Board Prize, 2015. £150.
- College Scholarship, 2015. £100.

Selected Talks

- Symmetry and Generalisation, Ard Louis Research Group, Department of Physics, University of Oxford, 2022.
- Equivariance in Deep Learning, Algebra Seminar, Department of Mathematics, University of Oxford, 2022. Joint with Sheheryar Zaidi.
- Test, Trace, Isolate. For the course Machine Learning and the Physical World, University of Cambridge, 2020. Joint with Andrei Paleyes.

Community

- Practicals Committee, Deep Learning Indaba 2023.
- Reviewer: AISTATS (2020).
- TA for B8.4 Information Theory, Hilary Term 2021. Mathematical Institute, University of Oxford.
- Organiser of OxCSML Deep and Probabilistic Learning Reading Group (2019-2020).
- Summer Schools: MLSS (2019), Princeton Deep Learning Theory Summer School (2021).
- Tuition and Oxbridge entrance assistance for disadvantaged students (2015-2018).