Daniel Mackinlay

Machine Learning Researcher

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PROFILE

Experienced, dynamic researcher with demonstrated ability to generate impact through applying capabilities in computer and data sciences to solve previously impossible problems and make a difference in the world across diverse domain areas and methodologies. Utilises innovation skills to develop novel methods for analysing and predicting the behaviour of complex physical systems. Recognised for thinking outside of the box, I leverage my PhD in Mathematics and Statistics from UNSW, and my Masters in statistics from ETH Zürich to bring new ways of problem solving and to research and impact delivery.

- Article Authoring
- Research Projects
- Statistical Data Analysis
- Lecturing
- Curriculum Development
- Training & Assessment
- UX/UI Design
- People Management
- Artificial Intelligence
- Machine Learning
- Communication
- Problem Solving
- Stakeholder Engagement
- Innovation
- Time Management

EMPLOYMENT HISTORY

CSIRO **Aug 2020 to present**

Research Scientist

- Published papers in NeurIPS 2022 on benchmarking neural operator methods for solving partial differential equations using machine learning surrogates

Early Research Career Fellow

- Advanced the frontiers of research through my contribution to the Machine Learning and Artificial Intelligence Future Science Program hosted in CSIRO's Data61 by developing an advanced method for analysing and predicting the behaviour of complex physical systems utilising Bayesian analysis and Deep Learning.
- Developed well-researched and accurate conference papers for publication on methods and developed innovative methods through benchmarking datasets and developing open source code.

Interaction Consortium **Dec 2009 to Dec 2010**

Developer

- Developed robust and error-free code for full-text database for museum and gallery websites.

University of Technology of Sydney **July 2009 – Oct 2009**

Casual academic

- Provided high-quality teaching and learning experience to students undertaking Media Arts Networked Cultures course.
- Developed course material and curriculum. Designed a course delivered over a semester aligned to specified curriculum on current developments in online application development for creatives.
- Prepared lectures, inspired meaningful discussions to facilitate learning, and assessed students in accordance with the University's academic grading scheme.

Powerhouse Museum, Sydney **March 2007 to Dec 2009**

Lead Developer, About NSW Project

- Led and oversaw the activities carried out by 2 high-performing developers undertaking research projects.
- Overhauled a government open data prototype website encompassing data ingestion, search, index and user interface

Publications

- *D MacKinlay,* R Tsuchida, D Pagendam, P Kuhnert. **Gaussian Ensemble Belief Propagation for Efficient Inference in High-Dimensional Systems**. Preprint under review. https://arxiv.org/abs/2402.08193
- Takaomoto M, *D Mackinlay*, Francesco Alesiani, Timothy Praditia, Raphael Leiteritz, Dirk Pflüger, Matthias Niepert, **PDEBench: A Stringent Benchmark for Partial Differential Equation Model Remulation**. Neurips 2022
- D Pagendam, S Janardhanan, J Dabrowski, *D MacKinlay,* **A log-additive neural model for spatio-temporal prediction of groundwater levels**. *Spatial Statistics* 55, 100740
- JJ Dabrowski, DE Pagendam, J Hilton, C Sanderson, *D MacKinlay*, **A Bayesian physics informed neural networks for data assimilation and spatio-temporal modelling of wildfires.** *Spatial Statistics 55*, 100746
- *MacKinlay, D* , Dan Pagendam, Petra M Kuhnert, Tao Cui, David Robertson, Sreekanth Janardhanan, 2021, **Model Inversion for Spatio-temporal Processes using the Fourier Neural Operator,** Neurips Workshop on Machine learning for the Physical Sciences
- Nadhir Ben Rached, *D MacKinlay,* Zdravko Botev, Raul Tempone, Mohamed-Slim Alouini, (2020) **A Universal Splitting Estimator for the Performance Evaluation of Wireless Communications** Systems *IEEE Transactions on Wireless Communications* https://arxiv.org/abs/1908.10616v1
- Botev, Z. I., Salomone, R., & Mackinlay, D. (2019). **Fast and Accurate Computation of the Distribution of Sums of Dependent Log-normals**. *Annals of Operations Research*. https://doi.org/10.1007/s10479-019-03161-x
- MacKinlay, D. (2019). **Mosaic Style Transfer using Sparse Autocorrelograms**. *Proceedings of the 20th Conference of the International Society for Music Information Retrieval*, 5. http://archives.ismir.net/ismir2019/paper/000109.pdf

Education

Qualifications & Education:

2016 - 2020 **PhD in School of Mathematics and Statistics**, UNSW

2012 – 2015 **MSc Statistics**, Eidgenössische Technische Hochschule Zürich, under the Chair of Entrepreneurial Risks.

2006 – 2007 **Honours Thesis (First Class) on Economic/Ecological Models of Fishery Dynamics**, ANU

1999 – 2004 **Bachelor of Science (Applied Mathematics),** Australian National University

1999 – 2005 **Bachelor of Arts (Major in Human Ecology, Minor in Linguistics),** Australian National University

Referees

See application form.