Daniel MacKinlay

Machine Learning Researcher
https://danmackinlay.name

🏠 Location: Coburg Victoria 3058

✉ Email: dan@danmackinlay.name

📱 Tel: +61 412 671 082

PROFILE

I am an ML Researcher working in cross-disciplinary teams to delivery methodological advances in high impact areas resistant to classical approaches. I combine a background in several challenging application domains — ecosystems, virality, high–dimensional models — with rigorous mathematical approaches grounded in statistical theory and disciplined engineering practice. My recent research is in causally valid modelling of physical systems, and of understanding and mitigating challenges of agentic AI. I am impact driven, high-agency, intrinsically motivated, and value teamwork to solve hard problems.

› Article Authoring	› Ecology	› Communication
› Research Projects	› Econometrics	› Problem Solving
› Statistical Data Analysis	› People Management	› Remote Sensing
› Lecturing	› Artificial Intelligence	› Hydrology
› Causal inference	› Machine Learning	› Additive Manufacturing

Employment Highlights

CSIRO   **Aug 2020 to present**

Research Scientist

- As an *Impossible without You* Fellow at CSIRO's Data61 ICT research division I have been responsible for self-directed research in the aid of scientific impact, by authoring papers, and shipping code to further CSIRO'S goals of public good and furthering Australian Industry. My impact has been as the ML specialist in application domain teams targeting Additive Manufacturing, geospatial data analysis, and most recently, seeking to understand and control transformative AI systems. I have participated in such capacity-building activities citizenship activities as supervising students, co-convening the Machine Learning for Physical Systems community and the applied LLM User's group, and advising the Australian Commonwealth and Public Sector Union on AI Policy.

Early Research Career Fellow

- As a postdoc I participated in the Machine Learning and Artificial Intelligence Future Science Program to advance CSIRO research capabilities in the domain of neural surrogate models to simplify intractable physical dynamics, targeting applications in groundwater hydrology. Ultimately I supervised 5 capstone engineering students as part of the team that delivered PDEBench (https://github.com/pdebench/PDEBench) the NeurIPS published benchmark suite for physical emulators

Publications

- Davie, L, *D MacKinlay,* R Olivera, S Sisson. **Amortized variational transdimensional inference**. Under submission. https://arxiv.org/abs/2506.04749

- *D MacKinlay,* R Tsuchida, D Pagendam, P Kuhnert. **Gaussian Ensemble Belief Propagation for Efficient Inference in High-Dimensional Systems**. ICLR 2025.. 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 Emulation**. 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

References upon application.