Thomas M. McDonald

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Full legal name: Thomas Mark Baldwin-McDonald

Education

2020–Present   **The University of Manchester**, *PhD in Computer Science*
- I am working in the machine learning group under the supervision of Dr Mauricio A. Álvarez.
- My research is focused on Bayesian deep learning, specifically deep Gaussian processes, latent force models and combining the advantages of physically-inspired and deep probabilistic models.

2019–2020   **The University of Sheffield**, *MSc Data Analytics*, *Distinction (78% average)*
- Involved courses on machine learning, natural language processing, parallel computing and statistical modelling, amongst other topics.
- The focus of my dissertation research project was the development of a probabilistic *deep latent force model*, under the supervision of Dr Mauricio Álvarez.

2015–2018   **The University of Sheffield**, *BSc Physics*, *1st Class (76% average)*
- Studying Physics equipped me with a solid mathematical foundation in vector and differential calculus, linear algebra, probability and statistics, as well as developing my ability to solve problems creatively.
- My undergraduate research project involved investigating the correlation between cellular motility and protein distribution via analysis of microscopic images using MATLAB.

Experience

Jun. 2022 – Sep. 2022   **Spotify**, *Research Scientist Intern*, London, UK
- I spent the summer working within Tech Research at Spotify on a project which leveraged Bayesian filtering and Thompson sampling to provide podcast recommendations which drive long-term user engagement.
- This work was presented at *KDD 2023* (see publications list for further details).

Oct. 2020 – Jan. 2022   **The University of Sheffield**, *Graduate Teaching Assistant (GTA)*, Sheffield, UK
- I have worked as a GTA on a number of different courses within the Faculty of Engineering, and currently assist with postgraduate-level courses focused on machine learning, handling data at scale using Spark and High Performance Computing infrastructure.

Oct. 2018 – Aug. 2019   **ENGIE Power Limited.**, *Pricing Analyst*, Leeds, UK
- My role involved employing statistical modelling to forecast national non-commodity cost components and mitigate the level of risk involved in signing energy supply contracts.
- Implemented seasonal ARIMA forecasting models in Python, with the models routinely returning $< 1\%$ error on predictions made three months ahead of time.
- Improved functionality of the VBA gas and electricity price matrices.

Publications, Talks & Reviewing († *denotes equal contribution*)

Conference Papers

- Impatient Bandits: Optimizing Recommendations for the Long-Term Without Delay.
  T. M. McDonald, L. Maystre, M. Lalmas, D. Russo, K. Ciosek.
  ACM SIGKDD Conference on Knowledge Discovery and Data Mining (KDD), Long Beach, USA, 2023.

- Nonparametric Gaussian Process Covariances via Multidimensional Convolutions.
  T. M. McDonald†, M. Ross†, M.T. Smith, M. A. Álvarez.
  International Conference on Artificial Intelligence and Statistics (AISTATS), Valencia, Spain, 2023.

- Compositional Modeling of Nonlinear Dynamical Systems with ODE-based Random Features.
  T. M. McDonald, M. A. Álvarez.
  Conference on Neural Information Processing Systems (NeurIPS), virtual, 2021.

Workshop Papers

- Bayesian Uncertainty Estimation in Landmark Localization using Convolutional Gaussian Processes.
  L. Schobs, T. M. McDonald, H. Lu.
  MICCAI Workshop on Uncertainty for Safe Utilization of Machine Learning in Medical Imaging, Vancouver, Canada, 2023.

- The University of Sheffield at CheckThat! 2020: Claim Identification & Verification on Twitter.
  T. McDonald, Z. Dong, Y. Zhang, R. Hampson, J. Young, Q. Cao, J. L. Leidner and M. Stevenson.
  Conference and Labs of the Evaluation Forum (CLEF), virtual, 2020.

Preprints

- One-shot Feature-Preserving Point Cloud Simplification with Gaussian Processes on Riemannian Manifolds
  S. Pathak[†], T. M. McDonald[†], R. Penne.
  arXiv:2303.15225, 2023.

- Shallow and Deep Nonparametric Convolutions for Gaussian Processes
  T. M. McDonald[†], M. Ross[†], M.T. Smith, M. A. Álvarez.
  arXiv:2206.08972, 2022.

Invited Talks

- Feature-Preserving Point Cloud Simplification with Gaussian Processes
  SciML Seminar Series, Leeds Institute of Data Analytics, 14th July 2023.

- Bayesian Deep Learning with Physics-informed Gaussian Processes
  CS PhD Symposium, University of Manchester, 24th May 2023.
  InViLab GP Seminar, University of Antwerp, 16th November 2022.
  N8 CIR Machine Learning Theme Launch, University of Leeds, 1st November 2022.

- AI in Modern Society
  Lecture Series, Rawdon Library, 14th March 2023.

- Deep Latent Force Models
  The 3rd Sheffield Workshop on Structural Dynamics, held virtually, 7th-10th December 2020.

Reviewing

- AISTATS (2022, 2023), NeurIPS (2022), ICML (2023), KDD (2023), ML4PS NeurIPS Workshop (2022)

Summer Schools

- **Oxford Machine Learning Summer School, 2021**
  ~ 6% acceptance rate.

- **Gaussian Process Summer School, 2020-2022**
  Attendee in 2020, organising committee in 2021 & 2022.

Technical Skills

Languages	Python, C, R, MATLAB, VBA
Data Handling	NumPy, pandas, Spark
ML	PyTorch, GPyTorch, TensorFlow, GPflow, scikit-learn, SciPy
Miscellaneous	Git, GitHub, LaTeX, OpenMP, CUDA, LabVIEW, Excel

Awards & Scholarships

EPSRC Scholarship	In 2020, I was awarded a 3.5 year scholarship from the Engineering and Physical Sciences Research Council (EPSRC) in support of my PhD research project.
epiGenesys Scholarship	I was one of three taught postgraduate computer science students in the 2019/20 academic year to receive a scholarship from software company epiGenesys.
Black & Gold Award	In May 2018, I received this award for sustained commitment and outstanding contribution to sport during my three years with The University of Sheffield baseball team as a member, club secretary, and later club president.