James Thornton

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Education

PhD Research Student, Computational Statistics and Machine Learning 2019 - 2023
University of Oxford
Supervised by George Deligiannidis and Arnaud Doucet
Deep Generative Modeling • Optimal Transport • Time-series • Probabilistic ML

Probationary Researcher, Statistical Science 2018 - 2019
University of Oxford
Centre for Doctoral Training • Taught year (equivalent to Masters)

BSc Mathematics, Operational Research, Statistics and Economics 2012 - 2016
University of Warwick. **Distinction / First Class Honors (85%)**, supervised by Anthony Lee
Rank 1-3 each year • EY Scholarship • Statistics Department Scholarship • Tukey Award for top dissertation (89%)

A-Levels, High School/ 6th Form College 2010 - 2012
5 A*: Mathematics **(2 years early)**, Further Mathematics, Physics, Chemistry, Economics

Experience

Research Intern 11/2021 - 12/2021
Astrazeneca, Respiratory AI
- Signal processing for time-series.
- Developed deep attention based models on audio data for the purpose of detecting respiratory illness.

Research Intern, Part-time 09/2021 - 12/2021
Arabesque AI (start-up)
- Generative modeling, nowcasting and data imputation for financial time-series.
- Utilizing score-based / diffusion methods, GPs, VAEs and deep state-space models on GCP.

Analyst | Markets and Analytics Group 2016 - 2018
BlackRock
- Built out time-series, portfolio analysis, and optimization frameworks for €4-300bn portfolios.
- Worked across > 15 engagements from data-wrangling ~ 100GB datasets to predictive modeling, delivering over $\$10$mil revenue using SQL, Perl, Python, R, C++ and Aladdin.
- Communicated methodology to CEO and board-level clients.
- Developed and deployed software, sold for ∼€1mil.

Publications

- Differentiable Particle Filtering via Entropy-Regularized Optimal Transport.
  J Thornton*, A Corenflos*, G Deligiannidis, A Doucet
  ICML 2021. Oral/ Long talk, Top 3%, * First Author. Link
- Diffusion Schrödinger Bridge with Applications to Score-Based Generative Modeling.
  V De Bortoli, **J Thornton**, J Heng, A Doucet
  NeurIPS 2021. Spotlight, Top 3%. Link
- The Masked Bouncy Particle Sampler: Parallelized, Piecewise-Deterministic MCMC.
  J Thornton, G Deligiannidis, A Doucet Link
- Simulating Diffusion Bridges with Score Matching.
  V De Bortoli, A Doucet, J Heng, and **J Thornton**. Link

Technical Skills

- Python, R, C++ (order of proficiency)
- SQL, Unix, git, Slurm, AWS, GCP
- PyTorch, Jax (Flax), TensorFlow
- Hydra, MLFlow, ml_collections, PyTorch Lightning, HuggingFace accelerate (open source contributions)

Seminars and Workshops

- Diffusion Generative Modeling and the Schrodinger Bridge
  Aalto, Advances in Probabilistic ML 2021. Invited talk.
- Diffusion Generative Modeling and the Schrodinger Bridge
  Astrazeneca Journal Club 2021. Invited talk.
- Diffusion Generative Modeling and the Schrodinger Bridge
  DataSig: Rough Path Interest Group 2021. Invited talk.
- End-to-End Learning via Differentiable Particle Filtering
  CIRM: End-to-end Bayesian Learning Methods, 2021. Workshop, contributed talk.
- Applications of Optimal Transport
  Arabesque AI, 2021. Invited talk.
- Differentiable Particle Filtering with Optimal Transport
  Waymo, Oxford 2021. Invited talk.
- Differentiable Particle Filtering with Optimal Transport
  Warwick University Seminars in Computer Intensive Statistics, 2020. Invited talk.

Academic Service and Teaching

Reviewer — **2020 - Present**
- AISTATS 2021
- NeurIPS 2021: *Outstanding Reviewer Award*
- NeurIPS 2020

Class Tutor — **2019 - 2020**
Department of Statistics, University of Oxford
Masters/ 4th year undergraduate Advanced Simulation Methods

Teaching Assistant — **2019 - 2020**
Balliol College, University of Oxford
Calculus, Probability, Statistics and Data Analysis

Class Tutor — **2015 - 2016**
Warwick University
Introduction to Analysis and Algebra, 1st year undergraduates