

EXPERIENCE

- **BlackRock - Systematic Active Equities** London, UK
Researcher *March 2023 - Present*
 - Researcher for ML-driven systematic trading fund, deploying fully autonomous algorithms.
 - **Projects:**
 - * Prototyping GNN and Transformer-based models for large-scale, structured multivariate time-series forecasting
 - * Developing custom, convex-optimization head for direct mean-variance optimization of deep learning model forecasts.
 - * Implementing DeepMind's DeepEnsemble model for uncertainty quantification of time-series model forecasts, used to scale forecasts.
 - Experience training large PyTorch models on multi-node GPU clusters, using Slurm and PyTorch's DDP.
 - Experience with distributed blackbox-optimization methods using Optuna.
- **Open Climate Fix** London, UK
Machine Learning Research Intern *November 2022 - March 2023*
 - Internship at open-source, non-profit research lab, focusing on deep learning methods for meteorological spatio-temporal forecasting. Received full-time offer for immediate start.
 - Experience with distributed training of large-scale deep learning models (200M+ parameters) on GPU clusters with DDP and DeepSpeed-Zero.
 - **Projects:**
 - * Implementation, adaptation of Google's MetNet model for solar photo-voltaic (PV) forecasting [GitHub Repository].
 - * Developed and productionized gradient boosted model for national PV time-series forecasting [GitHub Repository]
 - * Contributing to OCF's dataloader, testing chunked-storage compression algorithms for fastest IO in model training.
 - * Working with large zarr-based datasets (> 5TB) of weather and satellite data using xarray and dask.
- **DRW Holdings LLC** London, UK
Quantitative Trading Research Analyst *November 2020 - September 2022*
 - Hybrid trading and research position at high frequency algorithmic trading firm.
 - **Projects:**
 - * Developing ML algorithms for non-stationary time-series clustering and forecasting problems.
 - * Developing online state-space models for multivariate time-series forecasting.
 - * Optimization of distributed network signals and order routing for high frequency trading strategies using graph partitioning algorithms
 - * Experience writing production Python code and using HPCs for model research.
- **Susquehanna International Group** Dublin, Ireland
Quantitative Trading Intern *July 2018 - September 2018*
 - Internship at a high frequency quantitatively-driven trading firm.
 - **Project:** Time-series outlier detection for > 500 concurrent data streams using automated feature extraction and gradient boosted models.

EDUCATION

- **University of Oxford** Oxford, UK
Master of Science in Mathematical Sciences; Distinction *Sept. 2019 - Sept. 2020*
 - **Lord Crewe & Sloane-Robinson Scholarships:** Prestigious and extremely selective university-wide scholarships.
 - Focus on Deep Learning, Optimization, Network Modelling and Numerical Linear Algebra.
 - **Notable projects:**
 - * Deep Learning project investigating model pruning and optimization in CNNs (PyTorch)
 - * Networks project "Random Walks and Node Centrality on Hypergraphs". Novel generalisation of PageRank to Hypergraphs.
- **University of York** York, UK
Bachelor of Science in Mathematics; First with Distinction (91%) *Sept. 2016 - July. 2019*
 - **P.B. Kennedy Prize & York Futures Scholarship:** Best examination award and social mobility scholarship
 - **Dissertation:** 90% "Statistical Inference for Ordinary Differential Equations". Investigation into parameter inference in ODE systems using MCMC.
 - **Notable results:** 96% Statistical Pattern Recognition, 95% Linear Algebra, 99% Numerical Methods for PDEs

PERSONAL PROJECTS

- **Precipitation Nowcasting Models**

June 2023 - Present:

- Implementing and applying SOTA next-frame prediction models to Swedish rainfall radar dataset.
- Full implementation of NowcastNet, ConvLSTM and maxViT model, with further aims to test Diffusion models (subject to compute) [GitHub Repository].

- **DOTA2 Hero Drafter: AlphaZero Recommender System**

December 2022 - Present:

- Developing DL-based MCTS algorithm for predicting optimal hero choices, for turn based drafting portion of DOTA2 game.
- Developing policy model with self-play, trained on over 3M real DOTA2 drafts.
- Model currently outperforms previous SOTA draft model (generic MCTS) [GitHub Repository].

- **Automated Vegetation System**

December 2020:

- Using Arduino and Raspberry Pi to create monitoring software for automated indoor vegetation growth
- Basic time series forecasting of environment variables to predict system parameter adjustments
- Developed basic familiarity with C++

SKILLS AND INTERESTS

- **Interests:** Interested in the application of ML and optimization to solve difficult real-world problems, network modelling and general time-series forecasting of particular interest.
- **Skills:** Python, with classical (sklearn, SciPy, lightgbm) and modern machine learning libraries (PyTorch). Experience with Linux, Git, Slurm, Docker, Airflow, wandb, AWS and GCP.