Alexander Bowring

Population Health PhD, Mathematics BSc

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Summary

Senior Mathematical Consultant and **Technical Lead**, passionate about applying **statistics**, **machine learning**, and **optimisation** to deliver actionable solutions to ambitious technical challenges. I have led technical teams across a **portfolio of projects exceeding £1M** in revenue, receiving **national awards** for innovation and impact. Skilled in programming languages: **Python**, **R**, **SQL**; libraries and frameworks: **LightGBM**, **PyTorch**, **pandas**, **scikit-learn**, **tidyverse**; and platforms and tools: **Azure DevOps**, **Git**, **AWS**, and **Power BI**. These skills are grounded in a technical background in statistics and mathematics, with a **PhD in Population Health from Oxford University** and **First-Class BSc in Mathematics from Warwick University**.

Professional Experience

Senior Mathematical Consultant (previously Mathematical Consultant) — Oxford, UK

Smith Institute — *Nov 2021 - Present*

- **Lead technical teams** and **oversee all technical aspects of projects** delivering advanced mathematical solutions to **large industry clients**, collaborating closely with diverse stakeholders and **disseminating findings regularly**.
- Lead the **Dynamic Reserve Setting (DRS)** project with the National Energy System Operator (NESO), developing **explainable AI models** that are **productionised** in the control room with a Power BI dashboard, **saving NESO gigawatts in reserve procurement and millions of pounds annually**.
- DRS project recognised with the **Operational Research Society Presidents Medal Award 2024** for the best practical application of operational research.
- Principal model developer for the **Vulnerability Future Energy Scenarios (VFES)** project with **Scottish and Southern Electricity Networks (SSEN)**, creating an **explainable AI model** to analyse vulnerability drivers and provide enhanced **decision intelligence** for strategic optimisation of customer support.
- VFES project recognised with the **Utility Week Unlocking Data Award 2024** and the **DataIQ Award for Best Use of AI for the Public Good 2024**.
- Led the implementation of **classification models using convolutional neural networks (CNNs)** for a **defence and security project**.

Early Career Research Fellow in Neuroimaging Statistics — Oxford, UK

Nuffield Department of Population Health, University of Oxford — *Nov 2019 - Nov 2021*

- Led research on variability in MRI results caused by differences in analytic workflows, using **Python**, **Matlab**, and **Unix** to run parallel analyses on a computing cluster.
- Developed **statistical methods** to assess the similarity of spatial maps and created **Python notebooks** for analysis and visualization.
- Organized and led a weekly **Neuroimaging Statistics Oxford reading group** featuring international experts.
- Taught PhD students **statistical methods**, **programming skills**, and aspects of **independent research**.

Research Assistant in Neuroimaging Statistics — Coventry, UK

Warwick Manufacturing Group, University of Warwick — *Nov 2015 - Oct 2016*

- Developed standard practices for **data-sharing** and **meta-analysis** in neuroimaging, improving reproducibility and collaboration.

- Performed extensive **fMRI analyses** using major neuroimaging software and maintained version control with **GitHub**, sharing results via online repositories.
- Mentored a visiting **PhD student** on a short-term research project that was subsequently published.

Undergraduate Research Intern — Coventry, UK

Undergraduate Research Support Scheme, University of Warwick — *Jun 2015 - Oct 2015*

- Assisted in developing software to **visualise fMRI results** and tested research prototypes through **data analysis**.
- Gained hands-on experience in **collaborative research** and effective **communication** with supervisors and team members.

Education

Doctor of Philosophy in Population Health — Oxford, UK

Nuffield Department of Population Health, University of Oxford — *Oct 2016 - Nov 2019*

Thesis: On the Reproducibility and Interpretability of Group-Level Task-fMRI Results

- Developed a novel **Confidence Sets method** for group-level inference on task-fMRI effect-size maps, resulting in two publications in *NeuroImage*.
- Evaluated reproducibility of task-fMRI results across software packages (AFNI, FSL, SPM), leading to a publication in *Human Brain Mapping* ranked in the top 5% of research outputs by Altmetric.

Bachelor of Science in Mathematics — University of Warwick, UK

University of Warwick — *Sep 2012 - Jul 2015*

Graduated with **First Class Honours**, achieving >80% in modules including Algebra II, Analysis III, Galois Theory, Programming for Scientists, and Mathematics by Computer.

Further Information

Publications: Several publications in high-impact journals including *Nature*, *NeuroImage*, and *Human Brain Mapping*. Full list available at Google Scholar.

Technical Skills:

- **Analytical:** Frequentist statistics, machine learning, gradient boosting, linear optimisation, data visualisation, feature engineering, explainable AI, neural networks
- **Programming Languages:** Python, R, SQL, Bash, RDF, Cypher
- **Libraries / Frameworks:** LightGBM, XGBoost, optuna, PyTorch, pandas, polars, scikit-learn, numpy, matplotlib, tidyverse
- **Tools / Platforms:** Power BI, Git, Azure DevOps, AWS, Neo4j, Microsoft Excel
- **Development Environments:** PyCharm, RStudio

Covid-19 County Case Tracker

From March 2020-January 2021 I developed and maintained the *Covid-19 County Case Tracker* R Shinyapp. I used R programming to harvest publicly available national Covid-19 data and provide visualisations of the trends in Covid-19 cases at the county-level in England and Scotland. During the first UK lockdown the app received over 100+ hours of usage per day, garnering attention from radio and media outlets including the Oxford Mail.