

Daniel Andrew Coulson

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EDUCATION

Cornell University

PhD in Statistics, 4.0 GPA

Thesis Committee: David S. Matteson, Martin T. Wells, and Y. Samuel Wang.

Relevant Courses: Bayesian Statistics and Data Analysis (A+), Time Series and Spatial Data Science (A), Mathematical Statistics 2 (A+), and Statistical Computing 1 (A).

August 2022 - Present

Ithaca, NY, USA

Newcastle University

BSc Hons Mathematics and Statistics, First Class Honours (88.3%)

Relevant courses: Stochastic Financial Modelling (94%), Time Series (91%), Bayesian Inference (97%), and Statistical Inference (94%). 70% UK = A/A+ U.S.

September 2019 - June 2022

Newcastle Upon Tyne, UK

RESEARCH EXPERIENCE

Bayesian Deep Learning for time series forecasting and classification, PhD student

August 2024 – March 2025

- Independently ideated a novel **machine learning** problem called **ForeClassing**.
- Formulated this problem mathematically and proved a motivating theorem.
- Proposed two novel **neural network** layers, Boltzmann Convolutions and Welford mean-variance layers.
- Created a novel **deep Bayesian neural network** called **ForeClassNet**.
- Implemented computationally in **Python** using the functional **TensorFlow** API.
- Evaluated the performance of **ForeClassNet** through several simulation scenarios and two real world examples.
- Achieved superior performance, up to 30%, in test set accuracy compared with current state-of-the-art methods.
- Wrote a paper to present work which can be found at: <https://arxiv.org/abs/2503.04956>.

Time varying correlation matrices with an Application to Financial Crises, PhD student

May 2023 - October 2024

- Developed a novel framework for modelling time varying correlation matrices.
- Ideated a novel scalar score to summarize the information in correlation matrices.
- Utilized **R** to implement an **MCMC** algorithm and a simulation study.
- Provided insights beyond measures such as the VIX index and portfolio level diversification information.
- Demonstrated empirically that portfolio diversification does not help in times of financial crisis.
- The paper can be found at: <https://danielcoulson.github.io/research/>.

Bayesian methods in Road Safety, Undergraduate Research assistant

June 2021 - September 2021

- Collaborated with Dr Lee Fawcett to predict road traffic casualties for a real-world road safety project.
- Developed a large simulation study to analyze road traffic casualties using a bespoke **MCMC** algorithm in **R**.
- Used real world data to help assess where new road safety measures should go and what type they should be.

Culture and Financial Reporting, Research assistant at Northumbria University (UK)

June 2018

- Collaborated with an Assistant Professor in the Accounting and Finance department on a research project.
- Statistically analyzed - using SPSS – companies' financial statements from various countries to investigate the impact of culture on the ordering of information.

ACADEMIC PROJECTS

- Wrote bespoke **R** code to run several online learning algorithms, reviewed theory and compared performance.
- Utilized **Python**, with **TensorFlow** to implement several **Deep learning** models for applications in Soil Science.
- Wrote bespoke **R** code to compute the Rumor Centrality of a network and assess its performance in detecting the true rumor source in a simulation study and real social network.

AWARDS AND HONOURS

- Statistics Graduate Summer Research assistant at Cornell University. **May - August 2023 & 2024**
- Reverend Gilbert Robertson Prize from Newcastle University for academic excellence. **July 2022**
- Accepted onto the London Mathematical Society undergraduate summer school. **July 2021**
- Academic Excellence Scholarship from Newcastle University. **November 2019**
- LAMDA Speaking in Public Grade 8 achieved with distinction (95%). **May 2019**
- AQA Unit Award Scheme for voluntary work with the UK educational charity Success4All. **January 2019**

TEACHING EXPERIENCE

- Teaching assistant for a two-semester class on Statistical Methods for Graduate students at Cornell University from non-quantitative backgrounds which includes teaching labs (45+ students each) and holding office hours.
- Economics mentor at Emmanuel College, Gateshead, UK, teaching economic theory.
- Tutor at Success4All, mentoring children from areas of low academic achievement in Math and English including children whose first language was not English.