**Daniel Andrew Coulson**

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**EDUCATION**

**Cornell University August 2022 - Present**

**PhD in Statistics, 4.0 GPA**  Ithaca, NY, USA

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).

**Newcastle University September 2019 - June 2022**

**BSc Hons Mathematics and Statistics, First Class Honours (88.3%)** Newcastle Upon Tyne, UK

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

**RESEARCH EXPERIENCE**

**Bayesian Deep Learning for time series forecasting and classification, PhD student August 2024 – March 2025**

* Independently ideated a novel **machine learning** problem named 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** named **ForeClassNet**.
* Computationally implemented this 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.
* Presented findings in a paper 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.
* Presented findings in a paper which 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 different countries to investigate the impact of culture on the ordering of information.

**ACADEMIC PROJECTS**

* Developed bespoke **R** code for several online learning algorithms, reviewed theory and compared performance.
* Utilized **Python**, with **TensorFlow** to implement several **Deep learning** models for applications in Soil Science.
* Developed 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 some children whose first language was not English.