# Alexander Imani Cowen-Rivers

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## Education and qualifications

**2017 –2018 Machine Learning & Data Science (MSc), University College London**

- Awarded Distinction from exam results and aiming to a publish my dissertation in AAAI 2019. Masters thesis chosen on "Neural Variational Knowledge Graphs", supervised by Prof. Sebastien Riedel and Dr. Pasquale Minervini, Machine Reading Group, UCL (~5/40 students selected for a project with the MR lab). For this project, I will be investigating the use of the Stochastic Variational Bayes Estimator for training probabilistic graph embedding's, later used for predictive uncertainty quantification.

    - Highlights include; Advanced Deep Learning and Reinforcement Learning, taught by DeepMind: Multi armed bandit - UCB, REINFORCE with Baseline. Gridworld – Double Q-Learning, Double SARSA, General Q-learning, Online Tabular Q-learning, Tabular Experience Replay, Tabular Dyna-Q, Experience Replay/ Dyna-Q with linear function approximation, Neural SARSA for fully observable and partially observable (with memory buffer) case. Deep Learning - MLP/ Convolutional network for MNIST classification, MLP/ Convolution network from scratch (numpy vector operations only) for MNIST classification, generative LSTM pixel prediction model, applied to image in-painting.

    - Web Economics, taught by Prof. Jun Wang: Individually implemented a multi-agent reinforcement learning advertisement bidding strategy, as well as the accompanying multi agent bidding environment, based on the paper "Budget Constrained Bidding by Model-free Reinforcement Learning in Display Advertising" (96% grade received).

    - Neural stance detection challenge, for a fact checking service.

    - Statistical Natural Language Processing, taught by Prof. Riedel: RNN based 5-sentence story understanding task – 88% grade received. Protein prediction task using hand engineered natural language features - 92%. Kneser-Kney language model for lyric generation– 82% grade received.

    - Introduction to Deep Learning, taught by Prof. Nic Lane: Analysed and optimised Prof. Wang's Information Retrieval Generative Adversarial Network (86% grade received).

    - In my spare time I am working on the AI-ON Few-Shot Music Generation project, with Hugo Larochelle, Chelsea Finn, Sachin Ravi. Currently, I am in the process of implementing the second LSTM baseline model for this project.

- Other subjects studied: Graphical Models, Applied Machine Learning, Statistical Data Science and Introduction to Machine Learning.

**2013 –2017: Mathematical Sciences (BSc), University of Bath.**

- At the end of my first year, I received one of the highest marks on the mathematics course (~330 people), in a pure mathematics exam – Algebra, where I scored 92%. This module was extremely challenging as the lecturer, Dr Geoff Smith, was the Chair of the UK team competing in the International Mathematical Olympiad.

**Employment History/ Volunteering**

**2017-2017: Researcher Assistant, Symbolic Computation, University of Bath & Coventry University**
*(Completed over the summer holidays, for the European Union funded* SC^2 project. *three months in total)*

- Full-time research role in a project at the intersection of Mathematics and Computer Science.
- Attended a fully sponsored (by SC^2) summer school at the University of Saarland, Germany.
- Contributed over 3000 lines of code to an existing 6000 mathematical software package.
- Proof of concept completed, positive results to be presented at the next SC^2 workshop, having received 3/3 accepts to the 2018 Federated Logic Conference, University of Oxford, as first author (see publications below).
- This research falls in the field of Computer Algebra – teaching machines how to solve algebraic tasks, partly pioneered by one of the project supervisors, Prof. Davenport (he invented the algorithm which allows computers to integrate during his PhD, Cambridge University).

**2016-2017: Student Researcher, Centre For Applied Autism Research, University of bath**
*(Volunteer Work - doesn't contribute to my degree)*

- I have co-authored a final year module for the BSc Psychology undergraduate programme, on "Computational Psychology", led by one my supervisors – Dr Chris Ashwin. I created material on a using a fuzzy logic cognitive mapper, called Brain Modeller. Final year undergraduate Psychologists will have the option to take this module and then go on to complete their final year project in the area.
- Additional project: Supervised by Professor Mike Tipping, researching into emotion recognition of EEG Time Series data, using Machine Learning. I was Professor Mike Tipping's only undergraduate supervision, which was competitive to acquire. He is a world-renowned researcher, widely known for his work while researching with Dr Christopher Bishop, Microsoft Research, Cambridge, where he developed the Relevance Vector Machine.

**2015 - 2016: CUSTOMER INSIGHT Analyst, Burberry**
*(This was a twelve-month placement role. 20th July 2015 – 22nd July 2016)*

- End to end delivery of a self-service analytical tool for Allocation, Merchandising, Planning and Customer Analytics teams. Within this delivery I created and delivered training material for three workshops, with over 70 stakeholders up to SVP level).
- Descriptive, analytical projects across Marketing, Product and Retail (up to Senior Vice-President level). Influencing marketing budget decisions for festive periods.

**Publications**

**2018 –** Towards Incremental Cylindrical Algebraic Decomposition in Maple, Alexander I. Cowen-Rivers, Matthew England. Federated Logic Conference, SC-SC Workshop, Oxford University.

**Grants**
**2018 –** Federated Logic Conference 2018 Travel Stipend.

**Invited talks**
**2018 –** Towards Incremental Cylindrical Algebraic Decomposition in Maple, Federated Logic Conference 2018, Oxford University, UK.

**Programming Languages** Competent in Tensorflow, SQL, Python, Matlab and Maple. Experience with Unix, R, Haskell, Java.