Cameron Shand

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Summary

PhD student (currently awaiting *viva*) at the University of Manchester researching in the fields of **evolutionary computation** and **machine learning**. My research is mainly focussed on **clustering**, particularly investigating the role of evolutionary algorithms and synthetic data. This culminated with the development of a **synthetic data generator** called *HAWKS*, to create datasets of varied and controlled difficulty. In general, I am interested in the development and application of machine learning and optimisation techniques in the field of healthcare, integrating my previous field of biochemical engineering.

Education

University of Manchester

Manchester, UK

PhD Computer Science (4-year CDT; EPSRC-funded)- *Evolutionary algorithms in clustering: Challenging problem generation and search space adaptation* — *Sept. 2015 - Dec. 2019*

- Developed a tool for evolving synthetic data of defined difficulties to facilitate thorough empirical studies and algorithmic development
- Focused on using multi-objective evolutionary algorithms for clustering, looking at their performance, scalability, and applicability
- Co-supervised two MSc dissertations extending part of our previously published work
- Offer support and advice to fellow PhD students as a PGR Mentor — organising social events as well as sitting on committees as the student representative

UCL (University College London)

London, UK

MEng Biochemical Engineering with Bioprocess Management - First Class (hons) — *Sept. 2010 - July. 2015*

- For 3rd year group 'Design Project', we designed a production facility, conducted market research, specified the production process, performed an economic appraisal, and presented to experts for the production of a monoclonal antibody therapeutic biosimilar
- Wrote Master's thesis entitled '*The Challenges Facing a Stem Cell Therapy to Restore Cardiac Function Following an Acute Myocardial Infarction*', analysing the current state of the technical and practical challenges for both a clinically and commercially successful therapy.
- Selected for UCL's 'Focus on Management' course, where I tackled case studies from companies such as GSK and Capco using different teamwork and management styles
- A range of subjects were covered during the degree, with modules such as *'Fluid Flow and Mixing in Bioprocesses', 'Cell Therapy Biology, Bioprocessing and Clinical Translation'*, and *'Biochemistry of Protein Production Bioprocess'*

Work Experience

IBM Research

Warrington, UK

Research Intern — *Feb. 2019 - May 2019*

- Tasked with predicting disease status from oral metagenomic samples
- Required pre-processing data from several different longitudinal studies
- Created explainable ML framework for analysing metagenomic data, from preprocessing to hyperparameter optimization to analysis
- Presented results to client, highlighting protective and causative bacterial species through explainable machine learning (e.g. SHAP)

University of Manchester

Manchester, UK

Graduate Teaching Assistant (GTA) — *Sept. 2016 - PRESENT*

- Designed lab exercises and demonstrated for *'Programming in Python for Business Analytics'* Master's module
- Coordinated other GTAs as Head GTA, moderated marking, designed coursework, and held weekly 1-hour tutorials for *'Data Engineering'* Master's module
- Assisted in re-design of material for *'Understanding Data and their Environment'* Master's module
- Demonstrated/marked for *'Foundations of Machine Learning'* and *'Modelling and Visualization of High Dimensional Data'* Master's modules
- Demonstrated for *'Fundamentals of Data Analytics'* and *'Business Data Analytics'* undergraduate modules

Consulting Data Scientist *May 2017 - Aug. 2017*

- Virtuoso: Learning from professional violinists using biometric data
  - Asked to collaborate in an early-stage project that received seed funding to assess technical and commercial feasibility
  - Analysed noisy temporal data from a wearable device to measure differences between expert and amateur violinists
  - Assisted with seeking further funding to continue the project and to outline the next technical and theoretical steps
- *BAE Systems* workshop
  - Invited to Data Science workshop
  - Provided advice on a multitude of optimization and ML problems

AggioSergeant *London, UK*

Data Analyst *Sept. 2014 - July 2015*

- Created more efficient workflows for tracking and managing candidates in the database, producing the accompanying training materials to facilitate this
- Sourced candidates from across the globe for challenging client requirements, where previous companies had failed to deliver
- Amassed and analysed internal data to provide statistics for prospective clients

F. Hoffmann-La Roche AG *Basel, Switzerland*

Intern *Aug. 2013 - July 2014*

- Tasked with designing a new pilot-plant, requiring interaction with various departments (engineering, architecture, project management, and legal) and ascertaining the complex requirements
- Given a formal approval of the design and a £5mil budget after 4 months, despite being given the full 12 months to complete the task
- Remainder of internship was used to assist the group, including: the validation and programming of an automated liquid-handling platform; the design of a lab with strict regulatory requirements; and, creating an automated workflow for analysis of lab work

AggioSergeant *London, UK*

Intern *June 2013 - July 2013*

- Produced internal guide on search/crawling to improve candidate sourcing
- Met with prospective clients alongside business development manager to gauge suitability of our services

Publications

Evolving Controllably Difficult Datasets for Clustering

Cameron Shand, Richard Allmendinger, Julia Handl, Andrew Webb, and John Keane

In GECCO'19: Genetic and Evolutionary Computation Conference, July 15–19, 2019, Prague, Czech Republic. ACM, New York, NY, USA, 8 pages. https://doi.org/10.1145/3321707.3321761

N.B.: **Nominated for a best paper award.**

Towards an Adaptive Encoding for Evolutionary Data Clustering

Cameron Shand, Richard Allmendinger, Julia Handl, and John Keane

In GECCO'18: Genetic and Evolutionary Computation Conference, July 15–19, 2018, Kyoto, Japan. ACM, New York, NY, USA, 8 pages. https://doi.org/10.1145/3205455.3205506

N.B.: GECCO is a CORE2018 A-ranked conference.

Skills

Programming	Python **>>>** R **>** MATLAB **>** C++ & Julia
Tools/Libraries	Git, numpy/scipy/matplotlib/pandas etc., TensorFlow, DEAP, SHAP, ELI5
Languages	English (native) & German (CEF A2)

Interests

Sports	Squash, badminton, hockey, climbing
Hobbies	Board games, reading (primarily history and fantasy), podcasts
Charity	Organised black tie charity events for Cancer Research UK with family, as well as doing the Yorkshire Three Peaks Challenge and London 10K for Breast Cancer Care UK raising ~£10,000