

Cameron Shand

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Education

University of Manchester

Manchester, UK

PHD COMPUTER SCIENCE (4-YEAR CDT; EPSRC-FUNDED)

Sept. 2015 – Apr. 2020

Title *Evolutionary algorithms in clustering: Challenging problem generation and search space adaptation*

Topics Clustering, evolutionary computation, multi-objective optimization, algorithm selection

Highlighted Project HAWKS (<https://hawks.readthedocs.io/>)

UCL (University College London)

London, UK

FIRST CLASS (HONS) MEng BIOCHEMICAL ENGINEERING WITH BIOPROCESS MANAGEMENT

Sept. 2010 – July 2015

Topics Mathematical modelling, biochemistry, economic appraisal, plant design, project management

Master's Project *Challenges facing a stem cell therapy to restore cardiac function following an acute myocardial infarction*

Professional Experience

UCL (University College London)

London, UK

RESEARCH FELLOW IN DISEASE PROGRESSION MODELLING AND MACHINE LEARNING FOR CLINICAL TRIALS

Sept. 2020 – Present

- Analysed subgroup treatment effects in multiple Alzheimer's clinical trials using disease progression models (DPMs), identifying novel data-driven approaches for patient selection and precision medicine
- Developing novel unsupervised methods for DPM with inherent uncertainty estimation and outlier detection
- Awarded ATI Postdoctoral Enrichment Award for multi-view clustering/VAEs for multiple neuroimaging modalities project
- Mentor in A-COMPS outreach scheme for students from disadvantaged backgrounds
- Assumed maintenance and greatly optimized `pySuStaIn`, a widely-used model in industry and academia
- Developed internal containerised tooling for neuroimaging processing
- Regularly present at journal clubs, interest groups, and give seminars within UCL's Centre for Medical Image Computing
- Created an interactive web application to prototype and investigate our disease progression models
- Won pitch at Race Against Dementia innovation accelerator, and came 2nd in NEUROHACK on dementia prediction problem

IBM Research

Warrington, UK

RESEARCH INTERN

Feb. 2019 – May 2019

- Created explainable ML framework for analysing metagenomic data to predict disease status
- Designed framework to handle whole pipeline: from pre-processing data to parameter search to producing graphs/analysis
- Incorporated numerous models to explore complexity vs. explainability, from random forests to XGBoost to neural networks
- Presented results to large pharma client, highlighting protective and causative bacterial species through explainable ML

University of Manchester

Manchester, UK

CONSULTING DATA SCIENTIST (PAID)

May 2017 – July 2020

- Virtuoso: Learning from professional violinists using biometric data
 - Invited 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
- BAE Systems workshop
 - Invited to Data Science workshop to provide expertise on ML and optimization problems
 - Presented actionable next steps needed to implement identified solutions

Roche

Basel, Switzerland

INTERN

Aug. 2013 – July 2014

- Designed new pilot-plant, liaising with engineering, project management, and legal departments to ascertain requirements
- Given a formal approval with a £5mil budget after 4 months, despite being given 12 months to complete the task
- Created various VBA tools for automated analysis

Teaching/Supervisory Experience

UCL (University College London)

London, UK

SUPERVISOR/MENTOR

Oct. 2021 – Present

- Primary supervisor for undergraduate project on cross-cohort data-driven subtype reproducibility
- Regularly mentor and support PhD students in POND group, both technically and working with local HPC resources

University of Manchester

Manchester, UK

GRADUATE TEACHING ASSISTANT (GTA)

Sept. 2016 – Apr 2020

- Demonstrated for: *Programming in Python for Business Analytics*, *Data Engineering*, *Foundations of Machine Learning*, and *Modelling and Visualization of High Dimensional Data* Master's modules; and, *Fundamentals of Data Analytics* and *Business Data Analytics* undergraduate modules
- Head GTA for *Data Engineering* — coordinated other GTAs, developed coursework, moderated marking, and delivered weekly 1-hour tutorials
- Nominated for teaching award by students for *Programming in Python* module

SUPERVISOR/MENTOR

Sept. 2017 – Present

- Supervised three MSc dissertations extending my work on search space adaptation and clustering with concept drift
- Supported and advised fellow PhD students as a PGR Mentor and CDT representative

Skills

Programming Python >>> Julia, Bash > R, L^AT_EX > MATLAB

Concepts Clustering, multi-objective optimization, generative models, Bayesian modelling, evolutionary computation, dimensionality reduction, statistical testing, explainability/interpretability

Software Engineering OOP, unit testing, version control, data structures, HPC, Docker/Singularity, AWS (EC2+S3)

Tools/Libraries Numpy/scipy/matplotlib/pandas/seaborn etc., Git, TensorFlow, PyTorch, PyMC/Aesara, Statsmodels, Streamlit

Languages English (native), German (CEF A2), Romanian (beginner)

Selected Publications

Please see [here](#) for a complete list (excluding recent conference abstracts on our work in Alzheimer's).

Targeted screening for Alzheimer's disease clinical trials using data-driven disease progression models

Neil P. Oxtoby, **Cameron Shand**, David M. Cash, Daniel C. Alexander, Frederik Barkhof, for the Alzheimer's Disease Neuroimaging Initiative, the Alzheimer's Disease Cooperative Study
Frontiers in Artificial Intelligence 5 (2022)

HAWKS: Evolving Challenging Benchmark Sets for Cluster Analysis

Cameron Shand, Richard Allmendinger, Julia Handl, Andrew Webb, and John Keane
IEEE Transactions on Evolutionary Computation (2021)

Explainable AI reveals changes in skin microbiome composition linked to phenotypic differences

Anna Paola Carrieri, Niina Haiminen, Sean Maudsley-Barton, Laura-Jayne Gardiner, Barry Murphy, Andrew Mayes, Sarah Paterson, Sally Grimshaw, Martyn Winn, **Cameron Shand**, Will Rowe, Stacy Hawkins, Ashley MacGuire-Flanagan, Jane Tazzioli, John Kenny, Laxmi Parida, Michael Hoptroff, Edward O. Pyzer-Knapp
Scientific reports 11.1 (2021): 1-18

Evolving Controllably Difficult Datasets for Clustering

Cameron Shand, Richard Allmendinger, Julia Handl, Andrew Webb, and John Keane
GECCO'19: Genetic and Evolutionary Computation Conference, 2019
N.B.: **NOMINATED FOR A BEST PAPER AWARD.**