Alan O'Callaghan

Curriculum Vitae

alan.ocallaghan@outlook.com | alanocallaghan.github.io | Alanocallaghan | alanocallaghan | Alan O'Callaghan

Skills

- Programming: R, C++, Ruby, Java, Python.
- Statistics: Bayesian modelling, GLM, survival analysis, high dimensional statistics.
- Computing: Linux/Unix, HPC, LaTeX, git, make, snakemake, unit testing, continuous integration.
- Web: HTML/CSS, JS, PHP, htmlwidgets (R).

Education

PhD, biomedical data science

MRC Human Genetics Unit, University of Edinburgh — *PhD*
2018 – 2022

- Statistical methods for, and applied statistical analysis of, single cell RNAseq with complex experimental designs.
- Implementation of scalable Bayesian inference (adaptive Metropolis within Gibbs, divide and conquer MCMC).
- Assisting other students and contributing to research and computing environment in the institute.

MSc, Bioinformatics and computational genomics

Queen's University Belfast — *MSc, (distinction)*
2014 – 2015

- Dissertation: Java-based eye-tracking and image analysis of histopathology whole slide images.
- Lectures: programming, image analysis, statistical learning techniques.
- Programming projects: Implementation of alignment, clustering, linear regression and cross-validation algorithms in R; cell detection, Ki67 quantification and image segmentation in Java.

BSc (hons), biopharmaceutical chemistry

National University of Ireland, Galway — *BSc (hons), 2.1*
2008 – 2013

- Research Project: Structure elucidation and structure-activity relationship of bioactive marine compound.
- Lectures: (bio)chemistry, toxicology, pharmacology, molecular modelling, drug discovery and design.

Experience

Postdoctoral research associate

MRC Biostatistics Unit, University of Cambridge — *2022 – present*

- Computational optimisation of Bayesian models for the identification of eQTLs from RNAseq data.
- Computational analysis of RNAseq data using gene signatures.

Research assistant

University of Edinburgh — *April 2021 – September 2021*

- Developing a Carpentries-style course in high-dimensional statistics.
- Certification as a trained Carpentries instructor (April 2021).

Bioinformatician

Fios Genomics — *October 2015 – August 2018*

- Communicating regularly with clients to plan projects and explain results.
- Exploratory and statistical analysis for academics and commercial clients.
- Statistical analysis & visualisations for client publications & commercial research projects.
- Developer, author & maintainer of proprietary R packages.
- Minor system administration tasks.

Writing

Co-authorships

- *heatmaply: an R package for creating interactive cluster heatmaps for online publishing.*

  Bioinformatics, 2017 (DOI)
- *Species-specific regulation of angiogenesis by glucocorticoids reveals contrasting effects on inflammatory and angiogenic pathways.*

  PLoS One, 2018 (DOI)
- *Stress perception impacts on clinical signs of skin ageing and modifies the epigenome.*

  Journal of Investigative Dermatology, 2016 (DOI)

In preparation

- Embracing heterogeneity in multi-donor single cell RNAseq data.
- Scalable Bayesian analysis of single-cell RNAseq data.
- A step-by-step analysis of expression variability using single cell RNA sequencing data.
- Variational inference for eQTL discovery with BaseQTL.

Teaching

Presenter/helper

Carpentries workshops — *Online, 2021 – ongoing*

- Data carpentries R for social sciencies (presenter)
- Python Intro for Libraries (helper)
- Statistics with R (helper)
- Data analysis and visualisation with Python for Genomics (helper)

IGMM statistical seminar series

Lectures — *Online, 2020*

- Exploratory data analysis
- Experimental design, hypothesis testing, statistical power

Applied analysis workshop for single cell RNAseq

One day workshop — *IGMM, 2020*

- Exploratory analysis
- Normalisation
- Feature selection
- Differential expression analysis Differential expression analysis
- Clustering

Teaching materials

Author/maintainer — *2021 – ongoing*

- High dimensional statistics with R
- OSCA multisample

Software

Bioconductor

Maintainer: BASiCS, BASiCStan, densvis, scater, snifter

CRAN

Maintainer: bayefdr, contrast
Contributor: heatmaply

Conferences and meetings

European Mathematical Genetics Meeting
PRESENTATION *Cambridge, 2022*
Optimising eQTL discovery with BaseQTL using a screening approach

IGMM internal meetings
POSTER *Edinburgh, 2019 – 2020*
Scalable Bayesian analysis of single cell RNAseq
Bayesian analysis of multi-donor scRNAseq data (2nd prize)

UoE Centre for Statistics conference
POSTER *Edinburgh, June 2019*
Scalable Bayesian analysis of single cell RNAseq

Quantitative Genomics
PRESENTATION *Francis Crick Institute, June 2019*
Scalable Bayesian analysis of single cell RNAseq

Genomic Medicine
POSTER *Edinburgh, May 2019*
Scalable Bayesian analysis of single cell RNAseq

Edinbr (R user group)
PRESENTATION *Edinburgh, March 2019*
Building interactive modules using htmlwidgets

Edinburgh Bioinformatics
PRESENTATION *Edinburgh, November 2018*
Interactive data visualisation using R and plotly.

Extracurricular

Society committees
EDINBURGH/GALWAY *Various*

- **IGMM Postgraduate Society (Edinburgh)**: Organising student events, advocating for improvements in student working conditions and well-being.
- **IGMM social committee (Edinburgh)**: Organising social events for students/postdocs/staff. Editor of noteworthy student Christmas movie, 2018.
- **Lotus society (Galway)**: Organising yoga classes and events for students/postdocs/staff.

Honors & Awards

- Best savoury food (mattar paneer), IGMM Christmas Party, 2018
- School of Chemistry Medal (Molecular Modelling and Drug Design,NUI Galway, 2011
- Entrance Scholarship, NUI Galway, 2008