SAM FLETCHER

the@realsamfletcher.com | realsamfletcher.com | linkedin.com/in/real-sam-fletcher | github.com/sof202

Education

University of Birmingham **Birmingham**
M.Sci Mathematics, (88.3%, first) Sep 2019 – Jul 2023

- Prizes: Non-graduating Year 3 Prize (2022), Corbett Prize (2023), IMA Prize (2023)
- Project: Developing a mathematical model to support hypotheses around *E.coli* gene regulatory networks
- Relevant Modules: Statistics, Advanced Mathematical Modelling, Linear Programming, Mathematics in Industry and Advanced Mathematical Biology

Experience

Graduate Research Assistant **Oct 2023 – Present**
University of Exeter *Exeter*

- Cell Type Deconvolution Software Development (GitHub): Created a C++ CLI tool that uses a quadratic programming algorithm and a hybrid approach to estimate the proportions of specific cell types in a bulk sample. Also collaborating with a research software engineer focusing on improving performance in a similarly designed Python CLI tool called COSMoS (repository is currently set to private).
- Hidden Markov Modelling (GitHub): Created a pipeline that uses a variety of novel techniques to determine the best number of states to use when the true number is unknown (where traditional heuristics like AIC/BIC fail to deliver).
- Lab Website (GitHub): Overhauled outdated lab website in free time using Hugo (static site generator). Required basic knowledge of html, css, js and go. Main idea is to allow PhD students to advertise their projects online without knowing anything about website development.
- Software Maintenance (GitHub): Collaborated with several colleagues in hackathons with the goal to improve the quality control pipeline contained within a central repository for the group. The biggest contributions to date involved creating GitHub pages to provide documentation and writing a proper standardized way to set up the environment needed to run the pipeline, saving many students hours (sometimes days) of time.

Data/Billing Analyst **Jul 2023 – Oct 2023**
Ginger Energy *Birmingham*

- Automation: Using Python and Microsoft Power BI, automated many menial everyday tasks carried out by employees, saving roughly 1.5 employees worth of work yearly.
- Energy Forecasting/Modeling: Using several data fitting methods, modeled two pricing strategies proposed to MEARS. Resulting in an estimated £250,000 reduction in gas bill for the company. Forecasting of time-series data required linear regression modeling and Fourier series fitting.
- Billing Recharge: Clients were mainly business owning large buildings housing multiple tenants. A collective bill was given for the building, the team's job was to process very poor meter reading data in order to fairly charge each individual tenant.

Internship **Jul 2021 – Sep 2021**
Avado - Fast Futures *Fully online*

- Digital and Data: Lessons and practicals centred around presenting collated data in a concise and narrative driven manner.
- Product pitching: Researching and then pitching a minimum viable product for BT, centred around helping young adults reduce their carbon footprint by minimising electronic waste.

Skills

Software best practices
Big advocate for clean, thorough and easily accessible documentation; readable code; Version control and CI/CD; standardised installation proceedures and setup scripts. Created version control tutorials to help onboard new PhD students.

Communication/Flexibility
Participated as a helper on multiple CFRR courses (machine learning and linear regression) and volunteered as a tutor in Sixth form and university. Describing an unfamiliar concept to a wide range of individuals with different backgrounds often requires multiple approaches, the first explanation often isn't enough. Being flexible and

tailoring communication to each individual has lead to the majority of students/participants quickly understanding the given content.

Problem Solving
A great aptitude for problem solving is common among top mathematics graduates. Re-framing problems, creating solutions and identifying potential issues are all core skills required in programming and mathematics.

Data analysis
Preprocessing, running software, performing statistical tests and visualising data are all very common tasks in current role. Data is unsurprisingly poor for epigenomic data in most circumstances. Thinking critically about how to clean data is a vital skill due to the large effect these decisions can have on potential research outputs.

Presenting
Delivered multiple presentations covering R package development, Intermediate Unix tutorials and basic software engineering practices to a small group of colleagues (5-15). Presenting was also fairly common during university education, specifically for large group projects and master's project.

Self-motivation
Obviously a core requirement of any student, but this has continued into work life due to an absence of a line manager (due to maternity leave). Setting targets, deadlines and sticking to these is important when working alone on projects. For example, this project was completed (from idea to execution) was predominantly completed without external input.

Full clean drivers license

Language Proficiency

Python - Proficient
Very useful for quickly prototyping research ideas. Currently using python for cell type deconvolution software development (example). Also occasionally used in personal projects.

R - Proficient
Lighter data analysis and plotting, used extensively at University of Exeter. Repositories: ChromOptimise, ChromBinarize, ChromCompare, DNAm Quality Control Pipeline.

C++ - Working Knowledge
Creating CLIs where computation time matters is impractical in a language like python when compiled languages like C++ exist. This project was one such time C++ proved useful, similar existing tools are shipped as R/ python packages and are 10-100x slower.

Shell - Proficient
Shell scripting is a necessity when working on HPC systems (*e.g.* Isambard2/3, ARCHER2 and Exeter owned machines). Such skills contribute massively to workflow optimisation.

Web Development (html, css, js) - Working Knowledge
I've created a static site) and a webapp in my free time. Nothing has been complex enough to warrant the use of a javascript framework, hence only 'working knowledge'.

Lua - Familiar
Very nice small, JIT compiled scripting language. This was used in a module at University of Birmingham (module score of 92%) and naturally used extensively in many configuration/dot files (*e.g.* text editors and terminal emulators).

SQL -Familiar
This was occasionally useful when collecting/aggregating billing information at Ginger Energy. It would be a matter of relearning the syntax to become proficient again.

MatLab - Familiar
Used in fourth year project at university for simulating bacterial populations and applying ordinary differential equation (ODE) solvers (*e.g.* ode45 and ode23).