James **O'Reilly**

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Interested in the application of mathematics and data science to challenging problems in biology, medicine and finance. Currently focused on statistical analysis of cellular heterogeneity in cancer.

Education

Katholieke Universiteit Leuven
Leuven, Belgium

M.Sc. in Bioinformatics — *Sept 2019 - Present*

- Thesis: Controlling intratumoural heterogeneity using the epigenome. Supervised by Prof. Thienpont at the Lab for Functional Epigenetics in the VIB institute. This is still in progress.
- Quantitative subjects: dynamical systems (85%), statistical methods for bioinformatics (75%), management of large-scale omics data (85%), Bayesian analysis, neural networks and deep learning. Further study of machine learning and SVMs in my final year.
- Biology/Informatics: Comparative and regulatory genomics: Genome, transcriptome, and epigenome analysis, both in bulk and single cell.

University of Bristol
Bristol, England

B.Sc. in Mathematics and Computer Science (Joint Honours) — *Sept 2016 - June 2019*

- Final grade: 67%. GPA: 3.7
- Maths: Foundational courses in calculus, probability, analysis, and linear algebra. Specialised in discrete mathematics, graph theory and information theory; focusing on codes, communication, and cryptographic schemes.
- Computer Science: Strong understanding of machine learning (77%) and computational neuroscience (84%). Significant programming and development work in Python.

Coláiste Choilm
Cork, Ireland

Irish Leaving Certificate — *Sept 2010 - June 2016*

- Maths (A1), Physics (A1), German (A1), Biology (A1), Business (A1), English (A2). Total points: 615/625. Received award from the Education Board of Cork for exceptional results.

Experience

DataCamp
Leuven, Belgium

Software Engineer Intern — *Jun 2020 - Aug 2020*

- Worked on a variety of projects as part of the learning experience engineering team. Tasks included implementing automated testing of code correctness in Python, optimising Docker images, and improving the python backend and feedback system.
- Gained experience with their entire devops infrastructure: using Git and Jira in a large team, and automated testing with CircleCI.

University of Bristol - Dept. of Computer Science
Bristol

Summer Research Intern — *Jun 2019 - Aug 2019*

- Investigated the application of deep neural networks in determining the statistical structure of language.
- Studied the mathematics underlying neural networks, NLP concepts, vectorisation of language, and the Word2Vec package.

Projects

- **Integration of single-cell multi-omics:** Working with the Aerts Lab in VIB to use machine learning to integrate scRNA-seq and scATAC-seq data. Implementing Uniform Manifold Approximation and t-SNE for cell-type annotation. Training machine learning models for prediction of gene expression. Performing factor analysis for multi-omic integration using MOFA+.
- **Neural networks and deep learning:** Implemented deep feature learning with a deep convolutional NN for image classification in Matlab. Worked to optimise network topology and hyperparameters. Critically evaluated different learning algorithms for NNs. Available on GitHub.
- **Neural networks and deep learning:** Implemented different generative models, including deep Boltzmann machines and generative adversarial networks (GANs). Investigated convergence and stability of DCGANs, with a focus on Wasserstein GANs. Available on GitHub.
- **Thesis at University of Bristol:** Conceptualised, designed, and evaluated a virtual reality learning environment (VRLE) for calculus education. The application allows a teacher to share a virtual learning space with up to 50 students. The project showed how student understanding of and engagement with abstract mathematical concepts could be improved using a VRLE, while facilitating both distance learning and learning for disabled students. Received a grade of 78%. Available on GitHub.
- **Finance and machine learning:** Outside of university study I have completed Datacamp courses for analysis of financial time-series data, machine learning for financial data, and portfolio analysis in Python. I have read CFA quantitative investment analysis books in my spare time and aim to continue this study while I complete my masters degree.

Skills

Programming	Proficient in Python, R, Matlab, and Bash. Experience with Julia, C, C#, Java, JAVAscript, haskell, LaTeX.
DevOps	Git, Docker, CircleCI, Jira
Bioinformatics	MOFA, ArchR, BLAST, DeSeq, Seurat, Signac, Pymol, BEAST, Tempest, and more
Languages	Irish, English, German (intermediate)