Hugh **Warden**

Machine Learning | Data Science | Statistics

@ hugh.warden@outlook.com github.com/hwarden162 hwarden.com

I am a PhD student at the Institute of Genetics and Cancer, part of the University of Edinburgh. I am very passionate about using my background in machine learning, data science and statistics in a more applied setting, working with a wide range of geneticists and biologists to solve real world problems. Some details of my work may have been omitted if they pertain to unpublished research.

Education

August 2025 – April 2022 | **PhD Genetics and Molecular Medicine, Khamseh Lab - Institute of Genetics and Cancer, University of Edinburgh**

I am currently studying for my PhD with the Khamseh Lab at the Institute of Genetics and Cancer. I will be using machine learning and cell painting to investigate how cancer affects cellular morphology. I am currently using Paquo to create a preprocessing pipepline to carry out machine learning on whole slide bioimages that interacts with already established QuPath projects. By doing this I am hoping to leverage the power of Python to carry out powerful analysis, but having all of the results output into a QuPath project that is easy to interpret.

Machine Learning | QuPath | Paquo | Python | Groovy | Bash | R | Cell Painting | Cancer | Genetics

March 2022 – January 2022 | **Rotation Project, Kudla Lab - Institute of Genetics and Cancer, University of Edinburgh**

I completed a 3 month rotation under the supervision of Grzegorz Kudla and Diego Oyarzún using machine learning to investigate the transcriptomic and morphological effects of certain mutations. As well as producing the computational pipelines for analysis, I also got hands on with the wet lab work. As part of this rotation I spent a lot of time in the tissue culture lab observing how to look after cells, as well as looking after some of my own cells independently.

Machine Learning | R | Python | Cell Painting | CellProfiler | Genetics | Cancer

December 2021 – September 2021 | **Rotation Project, Khamseh Lab - Institute of Genetics and Cancer, University of Edinburgh**

I spent 3 months working with Ava Khamseh producing a preprocessing pipeline for whole slide images to curate labelled data sets for machine learning. I worked in QuPath to understand how tools could be used to select various parts of images based on their immunohistochemistry. I then pulled this pipeline out of the GUI and into a groovy script so that it could be run on multiple images via the command line. After this, I worked on writing all of the meta scripts needed to submit these analyses as a job on the high performance cluster for fast analysis. I am now continuing this work as part of my PhD.

Bioimage Analysis | QuPath | Groovy | Bash | R | Python | Cancer | Genetics

September 2016 – August 2021 | **MMath Mathematics, University of Southampton,**

I started my degree on the BSc Maths With Computer Science Course, where I developed a good grounding in mathematics as well as programming. I switched to the integrated masters course in my second year to study a wider breadth of maths courses. However, I kept my computational flair by writing my third year dissertation on using supervised machine learning to classify 'cell type' based on scRNA-seq expression. This inspired me to focus on machine learning and data science for my masters, as well as introducing me to applications of maths in biomedicine, leading to my fourth year dissertation on the applications of hypergraph theory in the analysis of biological systems.

Machine Learning | Data Science | Statistics | Hypergraph Theory | R | Python | Java | Maths | Biology | Genetics

Programming Languages

Familiar With

- Version Control :
  - Git
  - GitHub/GitLab
- Bash
- Environment Managers :
  - Conda
  - REnv
- BioImage Analysis :
  - QuPath
  - Paquo
  - Cell Profiler
- Workflow Managers :
  - NextFlow
- LaTeX

Personal Interests

I am a keen trumpet player, having played for almost 18 years. On top of this I also play drums, piano, guitar, bass and trombone. I am a member of multiple bands playing anything from classical or baroque to jazz or show tunes. Over many years I have held multiple roles on the committees for my ensembles, gaining experience in organisation as well as event planning.

As well as participating in multiple ensembles, I also spent a lot of time organising music events. During my undergraduate studies I spent one year as the Performing Arts Music Representative, organising events for 17 ensembles. I also spent one year as the Performing Arts Officer chairing a committee overseeing the running of all 42 of the University's performing arts societies. For both of these years I was also a Strategic Board Member for the Turner Sims Concert Hall.

I have also played badminton for over 15 years. During my undergraduate studies I was a member of the Recreational Badminton Society (one year of which I was treasurer) including travelling to and participating in multiple International Student Badminton Tournaments.

Personal Projects

rhype : A Package For Working With Hypergraphs In R

2021 - Present

https://www.hwarden.com/project/rhype/working-with-hypergraphs-in-r-using-rhype/ github.com/hwarden162/rhype

I built my own R package for working with hypergraphs in R. It has multiple functions to turn data structures into an R6 hypergraph environment and then multiple functions for manipulating and analysing the hypergraph object. It is currently available to install from CRAN and the developement version is available from GitHub.

R | Package Developement | CRAN | Hypergraphs

Creating Digital Text Art Using JavaScript

March 2022

https://www.hwarden.com/project/creating-text-art-using-javascript/

I used the p5.js JavaScript library and some of my own cell painting photos to create a striking cover photo for an upcoming presentation.

p5.js | JavaScript | Text Art

References

Ava Khamseh
PI Khamseh Lab, IGC - Edinburgh
@ ava.khamseh@ed.ac.uk

Sjoerd Beentjes
PI Beentjes Lab, IGC - Edinburgh
@ sjoerd.beentjes@ed.ac.uk