Henry Wilde

PhD thesis (ongoing)

Title **Utilising machine learning to understand variability in the NHS.**

Supervisors Dr. Jonathan Gillard, Dr. Vincent Knight, Mr. Kendal Smith (NHS Wales)

Description The purpose of this project is to investigate variation in the service and cost of treating hospital patients in the Cwm Taf region of South Wales. My thesis focusses on identifying and analysing structures in the data of patients, and their treatments and associated clinical processes. By doing so, the system can be segmented without an external framework thus more clearly illustrating its dependencies and connections. The thesis also incorporates an extensive analysis of how algorithms are evaluated, and a toolkit on large-scale data science and software development best practices.

Education

2017–present **PhD, Applied Statistics, OR and Data Analytics (expected: Summer 2021)**, *Cardiff University*.
- Research interests: stochastic and healthcare modelling, unsupervised learning, game theory.
- Key skills: confidence in the principles of data science and mathematical programming, ability to develop industrial relationships, proficiency in LaTeX and Python.

2014–2017 **BSc, Mathematics (First Class Honours)**, *Cardiff University*.
- Key areas of study: mathematical methods for data mining, game theory, algorithms and heuristics.
- Projects included: building a simulation of a hospital emergency department, and a principal analysis of two game-theoretic strategies within an Iterated Prisoner's Dilemma tournament.

2012–2014 **A-level qualifications**, *Richard Huish College*, Taunton.
- A* Mathematics, A Further Mathematics, B Physics, A History (AS), STEP I

Relevant Experience

2019 **Project Allocation**, *Cardiff University*.
Two schools within the university have approached me to install a new framework for allocating students to projects in their final year. Making use of the matching library I maintain, I have been able to reduce the bulk workload of the teams down from a week to a matter of seconds. In doing so, the provided solution is both stable and student-optimal with almost all students the being allocated their first or second choice. This work is largely independent and the next step I wish to take is to develop a supporting browser-based app for schools to use, and a subsequent academic publication.

2018–present **Assessment Advisor**, *Cardiff University*.
I have acted as part of the assessment team for a Master's module on computational methods since the 2017/18 academic year. The assessment consists of a two-day hackathon involving several dozen students and my role has been to gauge and rank their abilities to work in teams to develop a piece of software for a certain mathematical task.

2018–present **Maths Support Assistant**, *Cardiff University*.
I provide mathematical aid to students from all schools within the university as part of the Maths Support Service. This drop-in service affords little scope for preparation and requires me to make use of my nature as a mathematician - to be proactive, analytical and logical - often covering far-reaching branches of mathematics in a session.

2017–present **Module Tutor**, *Cardiff University*.
Throughout my time as a postgraduate student, I have supported a number of modules as a tutor where my primary role is to lead weekly sessions with students. These sessions follow up on the content covered in lectures and I then assess the progress of the students. This role has given me countless opportunities to teach in group and one-on-one settings, and to play a key role in several active learning schemes.

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Publications and projects

2019 **Evolutionary Dataset Optimisation: learning algorithm quality through evolution**.
- e-Print: `https://arxiv.org/abs/1907.13508`
- Accompanying Python library: `https://github.com/daffidwilde/edo`

2018 **Matching: a package for solving matching games**.
- Python library: `https://github.com/daffidwilde/matching`
- Documentation: `https://readthedocs.io/matching`

Additional Activities

May 2019 **Welsh Mathematics Colloquium**, *Gregynog Hall*.
Gave an in-depth talk on the mathematical principles of evolutionary dataset optimisation and some of the issues surrounding algorithm evaluation.

Mar 2019 **Data Science Campus Seminar Series**, *Office for National Statistics*.
Spoke on the application of my work into evolutionary dataset optimisation. In particular, its applications to the field of data simulation and synthesis.

Feb 2019 **NHS Wales Modelling Collaborative**, *South Wales*.
Invited to speak about how I have approached my work for the Cwm Taf University Health Board. This involved an introduction to clustering and discussion around the pitfalls of not allowing data to drive decision making.

2018–present **Advanced Python Workshop**.
Founded a group for postgraduate students to engage in tutorial-based sessions about more advanced aspects of Python (such as parallelisation and automated testing) followed by a code clinic.

2018 **EURO Support for NATCOR Bursary**.
Financial support to attend NATCOR courses in Approximation Algorithms & Heuristics and Predictive Analysis & Forecasting.

2017–present **PyDiff: a Cardiff-based, Python discussion group**.
I have taken on responsibilities in the organisation of the group as well as speaking about the usefulness of specific libraries for handling larger-than-memory datasets with Python.

2016–present **South Wales Operational Research Discussion Society (SWORDS)**.
I have been an active member, regularly attending meetings and talks since becoming a member of the OR Society during my undergraduate degree.

References

Academic

Dr. Vincent Knight
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School of Mathematics, Cardiff University
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Personal

Mr. Alex Beeston
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The High Cross, Tottenham
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