Michael Bennett

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EDUCATION

MA Economics, Yale University **2022-2024**

Grade: Honors
Selected Modules: Computational Economics, Econometrics, Algorithms, Deep Learning
Example project: Object detection of cars from satellite images using Deep Learning.

- Trained, fine-tuned and evaluated YOLOv8n/s/m object detection models on aerial images.
- Used remote GPU rented via vast.ai, initialised using custom Docker image, increasing training speed over 100x at cost under $10.
- Wrote custom dataloaders in python to download large image datasets on remote servers at maximal speed, reducing GPU downtime cost.

BA Economics, University of Cambridge **2017-2020**

Grade: First Class
Selected Modules: Economic Theory, Advanced Econometrics, Mathematical Economics
Dissertation: Consumer Preference and Animal Welfare: Variable Population Models of the Farming Sector

PROFESSIONAL EXPERIENCE

Graduate Research Assistant **Oct 2023 – June 2024**

Yale University, New Haven, CT, US
Research software development for project on economic growth and clean energy.

- Created UML package and object diagrams to visualise and then improve software architecture for better performance, usability, and maintainability.
- Implemented improved architecture in Julia, upgrading user interface, data processing and first stage solution modules from MATLAB scripts to Julia command line application, leading to 50% runtime improvement and more transparent interface.
- Used Documenter.jl, GitHub Actions and GitHub Pages to produce and host automatically updating static website of documentation, eliminating documentation duplication and improving ease of interaction.
- Used Python to collect, visualise and analyse geospatial economic and climate data to quantify the empirical relationship between climate and productivity within geographical regions.

Genoeconomics Research Assistant **Jul 2020 – Jun 2022**

National Bureau of Economic Research, Cambridge, MA, US
Research software development in a cross-disciplinary statistical genetics and economics lab.

- Developed two command line applications for genetic data analysis on large human genetic datasets using Python, enabling efficient execution of novel statistical methods.
- Designed and implemented internal pipelines using Python, bash, and third-party CLI tools such as PLINK for processing of genetic datasets with sizes between 100GB and 1TB on remote high-performance machines 20% faster than prior pipelines on similar projects.
- Devised methodology to standardize measures of educational attainment across several national-level datasets. Authored the corresponding section in the resulting paper, published in *Nature Genetics* (2022) with 204 citations as of August 2024.
- Developed visualisation software using Python and matplotlib to produce custom publication-ready graphs (including Manhattan plots) and tables, saving development time for other team-members and allowing rapid automated edits prior to submission and resubmission.

Operations Research Intern **Jul 2019-Sep 2019**

Department for Work and Pensions, HM Government, London, UK

Data science project using data on customer interactions with Job Centres.

- Worked with colleagues to gain access to anonymised individual-level source data, built a working database for analysis from source data using SQL, saved as internal data product for other researchers.
- Ensembled machine learning techniques including LASSO regression and random forests to develop predictive model of customers call volume and used causal inference techniques to analyse factors that drive call volume, presenting results to leadership.

LEADERSHIP EXPERIENCE

Project Manager & Treasurer **Mar 2019 – Feb 2020**

Effective Altruism Cambridge, Cambridge, UK

Student-run organisation at the University of Cambridge

- Chaired leadership committee meetings and managed a team of 10 other volunteers to plan and run 40 events, achieving 20% increase in attendance compared to the previous year.
- Authored grant applications leading to £5000 in funding.

PUBLICATIONS

[Fifth Author] Okbay, A. et al. (2022). Polygenic prediction within and between families from a 3-million-person GWAS of educational attainment. Nature Genetics 54, 437-449.

[Sixth Author] Becker, J. et al. (2021). Resource Profile and User Guide of the Polygenic Index Repository. Nature Human Behaviour 5, 1744-1758.

INDEPENDENT PROJECTS

Stagehunter.cc: A daily web game that tests users' pro cycling knowledge. Built using Typescript and Next.js (frontend), Go (backend), Postgres (database), AWS (hosting) and Cloudflare (DNS).

raytracer: A C++ ray tracing command line program that implements the ray tracing algorithms from the books "Ray Tracing in One Weekend" and "Ray Tracing: The Next Week" by Peter Shirley. Also adds extra features: new shapes including triangles, and adaptive ray sampler, multithreading, support for diagnostic images, and a robust command line interface.

michaeldabennett.com: My personal website, built as a static site using Next.js, Tailwind CSS, and TypeScript, hosted on GitHub Pages.

gendata.py: A Python package that provides a very simple interface for reading and performing simple operations on human genetic data in bed/bim/fam format, documented using Sphinx.

Rusty Chess Clock: Customisable chess clock GUI (using iced-rs) and CLI (using termion) applications implemented in Rust, backed by a zero-dependency library providing chess clock API.

BellmanSolver.jl: A Julia package which provides methods for solving dynamic programming problems of one choice variable using Value Function Iteration or the Endogenous Grid Method.

NumericalMethods.jl: Provides custom pure-Julia numerical methods for the differentiation, interpolation, minimisation and root finding of univariate and multivariate functions.

Aiyagari_VFI: A simple website that presents a piece of graduate school Economics coursework and some interactive 3d graphs produced for it in an attractive and approachable manner.

AWARDS

Adam Smith Dissertation Prize 2020
Awarded to the best dissertation among all University of Cambridge Economics students.

Forethought Foundation Dissertation Commendation Award 2020
Awarded to dissertations that communicate insights relevant to the problem of global priority-setting.

Wright Prize 2019
Awarded for a First Class Examination result of special merit in official University Examinations.

St John's College Pre-Admissions Prize 2017
Awarded for exceptional academic achievements prior to admission to St John's College, Cambridge.

KEY SKILLS AND INTERESTS

Software Skills

- TypeScript
- React
- Go
- Python
- SQL
- C++
- Rust
- Julia
- Haskell
- Bash
- Docker
- Git
- AWS
- Linux
- PostgreSQL
- HTML
- CSS
- Next.js
- Tailwind CSS
- PyTorch

Technical Skills

- Software Design
- Software Testing
- Continuous Integration
- Continuous Deployment
- High Performance Computing
- Statistics
- Econometrics
- Machine Learning
- Deep Learning
- Data Visualisation

Soft Skills

- Communication
- Teamwork
- Leadership
- Organisation
- Research
- Problem Solving

Hobbies & Interests: Road cycling, hiking, rock climbing, trivia nights.