David Wu

Curriculum Vitae

Personal Details

Visa Status	New Zealand Citizen
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Work Experience

Research Fellow March 2023 - Present

Dept. Econometrics and Business Statistics, Monash University, Full-time

Modelling the surveillance and control of hospital-acquired infections in the Victorian healthcare system using stochastic simulation and network analysis methods in Python, using igraph, polars, matplotlib, and bespoke code. Raw data cleaning and processing in SQL and Python. Report and presentation writing using Quarto and LaTeX. Organised seminars for the NUMBAT group, and tutored for courses in the department on reproducible data practices.

Research Assistant July 2020 - Feb 2023

Te Pūnaha Matatini / Covid Modelling Aotearoa, Casual

Development of stochastic epidemic simulations on networks in Python to assist with New Zealand Government response to COVID-19. Implementation of a novel non-Markovian event-driven simulation method for a system with over 5 million agents using high-performance computing. Statistical analysis and reporting with pandas, matplotlib, and LaTeX.

Teaching Assistant Feb 2019 - June 2022

Dept. Engineering Science, University of Auckland, Part-time

Content development, tutoring, and administration of undergraduate laboratory sessions on numerical methods, software development practice, and computer systems in Python, MatLab, and C.

Software Engineer Jan 2018 - Nov 2018

Orion Health, Full-time

Site reliability engineering. Automated deployment and maintenance of Elasticsearch and Rhapsody (electronic health record interoperability platform) in AWS. Designed and executed migration plans for Ansible Tower and Elasticsearch instances.

Education

PhD Engineering Nov 2018 - Sept 2022

Dept. Engineering Science, University of Auckland

Thesis Topic: *Computational Methods in Epidemic Simulation, Inference and Uncertainty Quantification*

Mathematical modelling of epidemics. Stochastic simulation of large, complex systems on networks. Practical prediction and inference methods for misspecified models in mathematical epidemiology. Model inference approaches with surrogate models.

BE(Hons) Engineering Science Class of 2017

University of Auckland

GPA: 8.55/9.00 (A/A+ average)

Thesis Topic: *Mechanistic Modelling of the Immune System's Impact on Health*

Computational and mathematical modelling methods for physical systems. Continuum solid and fluid mechanics. Optimisation methods and data analysis. Engineering decision making, operations research, and project management.

Skills

Languages	English, Cantonese Chinese, Mandarin Chinese
Programming	Python, bash, SQL, LaTeX, MatLab, C++, R
Software	AWS, MS Excel, Ansible, GIMP

Papers

1. D. Wu, H. Petousis-Harris, J. Paynter, V. Suresh, O. J. Maclaren, "Likelihood-based estimation and prediction for a measles outbreak in Samoa" in Infectious Disease Modelling (doi: 10.1016/j.idm.2023.01.007)
2. Assortment of non-peer-reviewed reports for the New Zealand Government on COVID-19 in New Zealand, archived at `https://www.covid19modelling.ac.nz/reports/`

Conferences

ANZIAM	2024	Contributed talk: "Temporal trends of hospital transfer networks in Victoria for controlling the spread of antibiotic resistance"
Epidemics 9	2023	Contributed poster: "Estimation of Network Epidemic Models using Surrogate Correction"
ECMTB	2022	Contributed poster: "Sneaking non-Markovian dynamics into Gillespie's direct method for epidemic simulation"
NZWUQIP	2021	Contributed talk: "Likelihood-based estimation and prediction for misspecified epidemic models: an application to measles in Samoa"
ANZIAM	2020	Contributed talk: "Infectious disease outbreaks: inference and prediction under model misspecification and partially observed data"
MINZ	2019	Student Moderator, Challenge 4: "How can Mercury improve the generation efficiency of the Waikato hydro scheme?"
SMB	2018	Contributed talk: "A dynamical system model of host-pathogen interaction illustrates the role of the immune system in resilience to infection"

Software

hospinet	Python port of HospitalNetwork R package that cleans a patient admission database and generates a temporal network of patient transfers.

Awards and Honours

2023	2nd Place, UN Datathon (Down Under Data Wizards team)
2020	New Zealand Prime Minister's Science Prize (Te Pūnaha Matatini COVID-19 group)
2018	University of Auckland Doctoral Scholarship
2015-2017	University of Auckland Faculty of Engineering Dean's Honours List