Jacobus M. M. Smit

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Education

University of Amsterdam ***Amsterdam, NL***

PhD "Dynamics of Cooperation and Fairness in Artificial Systems" ***September 2022 – Ongoing***

- As part of the Socially Intelligent Artificial Systems group, my role lies in the crossover of multi-agent systems, (computational and evolutionary) game theory, dynamics on complex networks and algorithmic fairness.

University of Oxford ***Oxford, UK***

MSc Mathematical Sciences (Merit) ***October 2021 – June 2022***

- Courses in: Statistics for Network Analysis, Network Dynamics, Theories of Deep Learning, Advanced Statistical Machine Learning, Continuous Optimisation, Advanced Simulation Methods.
- Dissertation: Bayesian Calibration of Pedestrian Models (with Dr. Rafael Bailo). Awarded 78/100

University of Warwick ***Coventry, UK***

BSc Mathematics and Statistics (1st Class) ***October 2017 – June 2021***

Experience

Teaching Fellow ***October 2021 – March 2022***

University of Warwick ***Coventry, UK***

- Teaching seminars in Statistical Techniques (ST116) and Linear Modelling (ST221) to undergraduate students.
- Development of student experience initiatives, such as the student speaker series, blog posts for incoming students, and new modules to be offered by the department.
- Nominated for best postgraduate teacher in faculty awards.

(Freelance) Data Analyst ***January 2021 – April 2021***

West Midlands Police, Warwick Manufacturing Group ***Coventry, UK***

- Worked in a team of three undergraduate students to analyse telematics data with R (and Rcpp) from the West Midlands Police's vehicle fleet to provide various insights into improving areas such as fleet efficiency, response times, and environmental impact.
- Provided novel findings into areas WMP was already focused on such as the activity of the fleet over time and identification of potentially inefficient driving.

Junior Data Scientist ***February 2020 – August 2020***

QuantCube Technology ***Paris, France***

- Collaborated with a team of data scientists creating production-ready macroeconomic indicators in Python.
- Identified and optimised key data pipeline functions that were causing a bottleneck, providing a 3000% speedup.
- Independently researched and constructed an indicators to predict agricultural exports of various countries in South America.
- Presented key findings and progress reports in meetings using Jupyter and Powerpoint.
- Created documents explaining the practices and methodologies of my team intended for new hires in order to facilitate their arrival.

Research Projects | Co-author/Supervisor

Learning Fair Cooperation in Systems of Indirect Reciprocity | *Fernando Santos* ***Winter 2023***

- We study the stability of different strategies and norms and examine their level of fairness and show that disadvantaged groups can suffer in seemingly equal societies.
- Accepted to the *Adaptive Learning Agents* workshop at *AAMAS 2023*.

Multi-scale MLP-Mixer Architectures | *Patrick Kidger* ***Ongoing***

- We explore whether we can bring the MLP-Mixer up to the SOTA by allowing for patch mixing beyond a single patch-scale.
- I developed complex, custom deep learning models in JAX, then parallelised and trained them using cloud computing (GCP).

A Case Study of Agent-Based Models for Evolutionary Game Theory | *Ed Plumb* ***Summer 2021***

- Accepted to *Social Simulation Conference 2021*.
- Co-author contribution: analytical solution.

Open Source Contributions

Agents.jl | *Contributor (member of JuliaDynamics)*

- Lead the design and implementation of an interface for users to store agents in arbitrary data structures instead of dictionaries, allowing for more efficient vector models (2× faster) that take better advantage of cache locality.
- This contribution also refactored the internals and public API of adding and removing agents.
- Consistently provided code review on commits made to the repository to ensure that the code was sound, idiomatic, and well documented. Also introduced formatting regulations through JuliaFormatter to help automatically make new code consistent with existing code.

MultiMixer | *Author (Currently Pre-0.1)*

- This package is essentially a feature contribution to the JAX/Equinox ecosystem as it implements a highly optimised and tested, general form of the MLP-Mixer architecture.
- The package abstracts and builds upon the core ideas of the MLP-Mixer into a "backbone" while providing convenience functions for common use cases such as working with images.

Technical Skills and Technologies

Languages: Julia, Python (JAX), R (Tidyverse, Rcpp), SQL, BQN (a modern APL).
Skills: Git, mechanical sympathy, listening intently and learning quickly, digging into how tools work.
Competitions: Winning team in WDSS Helping Hack prediction competition. The objective was to understand and predict how local authority spending will impact indices of deprivation over time.

Other Skills

Languages: English (Native), French (B2), Spanish (B2), Dutch (A2).
Public Speaking: Creator of DataBasic podcast interviewing academics and industry leaders working with data. The goal of the podcast was to make data science simple and accessible through explaining the core concepts of the domain through engaging conversations covering related topics. Guests include best-selling author of "Predictive Analytics" Eric Siegel, Head of Analytics at Walgreens Boots Alliance, Simon Prinn, and Professor of Economics at the University of Warwick, Jonathan Cave.
Music: Served as a musical director of Warwick Acappella Society for two years.