Charles Ludowici, Ph.D.

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Skills and Tools

Experiments - Design and analysis, A/B tests

Statistical inference - Linear regression, generalized linear models, hypothesis testing, mixture models, splines, generalized additive models, mixed models

Machine learning - SVMs, multinomial logistic regression, reinforcement learning, random forests, MLP

Data science - R, Python, MATLAB**,** NumPy, pandas, Jupyter, Git, SQL

Math - Probability, statistics, linear algebra, multivariable calculus

Education

PhD (Science, Psychology)

The University of Sydney: 2016 - 2020

Thesis: *Temporal Selection in Dynamic Displays: Sensory Information Persists Despite Masking*

Bachelor of Arts (Psychology, Honours)

The University of Sydney: 2011 - 2015

Thesis: *Scaffolding Individual Differences in Category Learning*

Grade: First Class

Experience

Postdoctoral Scholar, The University of California, Berkeley: 02/2020 - present

- Designed experiments and statistical models (GAMs) that allowed me to be the first to observe how the visual system adapts eye movements to the presence of asymmetric central vision loss, a common property of visual disease
- Built a reinforcement learning model of eye movements in NumPy to validate an analysis of the difference between eye tracking machines
- Building, merging and modeling datasets containing millions of observations of human behavior and eye-movements using R, Python and SQL, regression and classification
- Designing and conducting experiments for research on visual function in ocular disease
- Responsible for training junior researchers and technical screening of lab hires
- **Tools:** Regression, reinforcement learning, multinomial logistic regression, splines, frequentist hypothesis tests, signal processing, GAMs, Matlab, Python, R

Visiting Scholar, Harvard University: 02/2019 - 06/2019

- Conducted data analysis and experimental design for research investigating why radiologists may miss cancer when viewing medical images
- **Tools:** Matlab, R, frequentist hypothesis tests

PhD Candidate, The University of Sydney : 2016 - 2020

- Designed and implemented novel mixture models, statistical tests and experimental methods that disproved long-standing theories of visual processing
- Lead author on publications and presentations. Responsible for analysis, data visualization, causal inference, responding to peer review, and structuring reproducible modeling and visualization code for hosting on GitHub
- Research funded by an Australian federal government scholarship
- **Tools:** Mixture models, novel analyses based on mixture distributions, mixed models, regression, Bayesian and frequentist hypothesis tests, R, Python, Matlab

TA and Lecturer, The University of Sydney: 2016 - 2018

- Statistics and Research Methods for Psych (PSYC2012)
- Quantitative Research Methods in Health (HSBH3018)

Research Assistant, The University of Sydney : 2014 - 2016

- Designed and led the analysis (in R) of a stratified experiment investigating children's understanding of other people's behaviour
- Analyzed data from experiments that investigated how people learn complicated relational information
- Wrote and visualized (ggplot) statistical results for academic papers and and conference presentations
- **Tools:** ANOVA, linear and logistic regression, mixed models, R

Examples of Analytic Work

- Causal inference using GAMs in R on company profit data from an A/B test. (link)
- A tutorial on building a mixed (hierarchical) model in Python from scratch (link)