

# Nicholas S. Hoernle

Ph.D Candidate - Informatics and Artificial Intelligence

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## Education

**University of Edinburgh** - Ph.D - Informatics and Artificial Intelligence Edinburgh, Scotland · Sept. 2018 - PRESENT

- **Commonwealth Scholarship** Sept. 2018 - Dec. 2021
- **Thesis:** *Understanding and Guiding Human Interaction in Collaborative Task Systems*. I research interpretable machine learning techniques for modeling human interaction in collaborative platforms such as Massive Open Online Courses and online question and answer websites. I use the models of peoples' actions to design incentives that guide their interactions on these platforms.
- Visiting researcher at the Ben-Gurion University of the Negev Jan. 2019 - Jul. 2019.

**Harvard University** - M. Eng. Computational Science and Engineering Cambridge, Massachusetts · Sept. 2016 - May. 2018

- **Master's Research Project:** Artificial Intelligence techniques for extracting explanatory scenarios from interaction logs of complex exploratory learning environments. This work has been in collaboration with New York Institute for Science (NYSCI) and has involved a group exploratory learning environment, Connected Worlds. The goal of the project is to use time series log information and user action data to assist students and teachers in discovering causal feedback loops in complex and interdependent systems. I have used dynamic Bayesian belief networks, and switching state-space models as modeling tools.
- **Relevant course work:** Data Science, Artificial Intelligence, Bayesian Inference, Decision Theory, Stochastic Optimisation, Numerical Methods, Statistical Sleuthing and Hypothesis Testing, Adv. Topics in Bayesian Inference (MIT)
- **Scholarships and studentships:** Harvard Institute for Applied Computational Science (IACS) Research Scholarship, South African Oppenheimer Scholarship for international postgraduate study.
- **GPA:** 3.96 · **GRE:** 162V, 168Q

**University of Cape Town** - BSc. Eng Electronic and Computer (*with first class honours*) Rondebosch, Cape Town · Jan. 2011 - Dec. 2014

- **Honour's Research Project:** Jun. 2014 - Dec. 2014  
Design project for ARV prescription management. Low-cost embedded software design and associated server implementation for physician-patient management and communication. The embedded smart medication container was designed for prescription management for complex medication regimes. This project was selected to represent UCT at the South African Institute for Electrical Engineers National Project Competition and won a merit award for the most innovative thesis.
- Dean's Merit List for first class honours degree.

## Experience

**Microsoft** - Data Science Intern Redmond, Washington · Jun. 2018 - Aug. 2018

- Intern on the Microsoft Data Science team at Redmond Seattle. My work was to implement a search tool, using word embeddings, to assist with the error fault triaging of free text bug reports.

**Harvard University, Data Science (CS209a)** - Teaching Fellow Cambridge, Massachusetts · Sept. 2017 - Dec. 2017

- Responsible for leading the advanced topics in data science tutorials. My work involved presenting data science material and writing tutorial notes (refer to my github account for these notes) and the associated homework problems. Topics included exploratory data analysis and investigation, generalised linear models for regression and classification, dimensionality reduction, decision trees and ensemble methods.

**Microsoft** - Data Science Intern Cambridge, Massachusetts · Jun. 2017 - Aug. 2017

- I worked with a team of 10 interns to develop transcription and closed captioning tools for a video editor (targeting use in the schooling environment). I was a senior member of the team and thus was tasked with mentoring many of my team mates through what was their first industry software development project. My technical contribution involved working with time series voice data to remove background noise from audio files to improve transcription quality and general quality of video recordings. I used a combination of Fourier analysis and deep learning to achieve these goals.

**Zappi Store** - Data Scientist Gardens, Cape Town · Jan. 2016 - Aug. 2016

- Development of a market research reporting engine. My work involved metaprogramming an abstracted data pipeline to allow combination and comparison of unstructured survey data. Heavy emphasis on git-flow and agile software development and extensive use of Jupyter notebooks.

**Rethink Education** - Founding Partner and Software Engineer Gardens, Cape Town · Nov. 2012 - Dec. 2015

- Development of platform and chat-styled content for interactive Mathematics and Physical Science content for mobile devices in South Africa.

## Published Work

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- ArXiv preprint.** - arXiv preprint arXiv:1909.11025. · 2019
- Hoernle, N., Gal, K., Grosz, B., Lyons, L., Ren, A. and Rubin, A., 2019. Interpretable Models of Human Interaction in Immersive Simulation Settings.
- User Modeling, Adaptation and Personalization** - UMAP · 2019
- Yanovsky, S., Hoernle, N., Lev, O. and Gal, K., 2019, June. One Size Does Not Fit All: Badge Behavior in Q&A Sites.
- International Educational Data Mining Society.** - EDM · 2019
- Shillo, R., Hoernle, N. and Gal, K., 2019. Detecting Creativity in an Open Ended Geometry Environment.
- International Educational Data Mining Society.** - EDM · 2018
- Hoernle, N., Gal, K., Grosz, B., Protopapas, P. and Rubin, A., 2018. Modeling the Effects of Students' Interactions with Immersive Simulations Using Markov Switching Systems.

## Achievements

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- Harvard University, Graduate School of Arts and Sciences** - Dudley Fellow [Cambridge, Massachusetts](#) · Sept. 2017 - Sept. 2018
- This position involved organizing outings trips for other graduate students to assist with general student well-being. I have arranged tours to historical, cultural and outdoor destinations throughout the year.
- National TV, South Africa** - Mathematics and Science Teacher on "Dream School" · Jun. 2015 - Jul. 2015
- Dream School was a nationally broadcast reality TV show that features 15 school students who had dropped out of high-school. Through the course of a 10 week intensive program the goal was to re-motivate the students to restart their high-school careers. The result of the show was that the students all received scholarships to a prestigious South African high-school.
- University of Cape Town, Wine Society** - Chairman [Rondebosch, Cape Town](#) · Nov. 2012 - Nov. 2014
- Increased membership by 40% to make it the largest subscription based society on campus with over 1000 members. Our events revolved around weekly wine tasting and information sessions with about 100 attendees.
- Gold Level Presidents Award** - Certificate for extramural and community service excellence.
- Hobbies** - Rock and ice climbing, ultra-distance trail running, kitesurfing, surfing, fly-fishing, water and snow skiing.
- Programming Languages** - Python, Java, Ruby, STAN-MC, Pyro, PyTorch, R, MATLAB, Javascript.