Contact Details
+61 410 092 367
Kelvin.Hsu@sydney.edu.au

KelvinHsu

Machine Learning PhD Candidate

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Professional & Research Experience

11/2014 — 07/2017 **Machine Learning Research Engineer** Data61, CSIRO (Formerly National ICT Australia)
Divisions: *Machine Learning Research Group*, *Engineering & Design*
Projects: *Big Data Knowledge Discovery under SIEF*

- **Development (Lead)**: **Led** design of active learning algorithms using Gaussian processes (GP); **Result**: Efficient informative exploration reduced required overall simulation time **from months to just hours**, making scientific discoveries in complex ecological systems feasible
- **Research (Lead)**: **Led** design of a mutual differential entropy measure for GP classification; **Result**: Applied to informative path planning; Published at *ACRA* and included in *honours thesis*
- **Development (Contributer)**: GP **python** library (**PEP8 style**) for active & multiclass learning
- **Research (Contributer)**: Bayesian optimisation, AutoML, and scalable approximate inference

"Kelvin's active sampling work has **made feasible** *the simulation work currently undertaken by Ecologists at Macquarie University, which would otherwise cost expensive computing resources and many months in time." (Link)*

-**Dr. Simon O'Callaghan**, Senior Research Engineer

11/2013 — 02/2014 **Software Engineering Intern (Space Science)** CSIRO Astronomy & Space Science
Project: *Astronomical Source Finding – Interactive Data Visualisation*

- Developed & released an **interactive data visualisation software** in **python**
  Intuitive for analysing radio astronomical data with *Duchamp*
- Produced & released modular parameter tracking software for *Duchamp*
- Collected and reduced astronomical data on my trip to *ATCA*
  Further analysed and deduced inter-galaxy interactions from HI radio emission data

"Kelvin has built a very impressive graphical interface that allows astronomers to make better sense, more quickly, of the results of their Duchamp search. It was a complex task, requiring **understanding of the various data structures and strong python programming skills***." (Link)*

-**Dr. Matthew Whiting**, Research Scientist (Computing) & Manager

11/2012 — 03/2013 **Research Scholar (Medical Physics)** The Institute of Biomedical Engineering and Technology

- Facilitated research in an emerging medical imaging technology
- Simulated ultrasound response of bio-tissues under magnetic stimulation
- **Verified** the physical processes involved as originally proposed with MATLAB
- **Demonstrated** possibility of performing tumour treatments without direct physical contact

"He took this project well in his stride, requiring little supervision and assistance. He was **able to solve problems on his own and by liaising with industry supervisors***. In my experience this is fairly rare with engineering students who have not been exposed to research." (Link)*

-**Dr. Alistair McEwan**, Professor & Research Project Supervisor

Teaching Experience

02/2013 — Now **Tutor** School of IT, AeroMech Engineering, Business Analytics, Mathematics & Statistics (University of Sydney)

- **Dean's Faculty Award Winner for Outstanding Tutoring 2017** (*See Award Recommendation*)
- **100% positive evaluations in anonymous student surveys since 2013** (extremely rare) — Main comments: Clear presentation, engaging style, friendly personality, emphathetic listener
- Taught courses at both undergraduate and postgraduate level in Machine Learning, Data Science, Statistics, Software Engineering, Systems Engineering, Space Engineering, and Risk Management (See my *LinkedIn* for detailed list and anonymous student feedback)

"Since 2013, Kelvin has always had a very high quantity of strong and enthusiastically positive comments, **without a single negative comment at all**. *Even amongst the excellent standard of tutors, this suggests to me that* **Kelvin is one of the best tutors of all time, even better than previous tutoring award winners**." *(Link)*

-**Dr. Jason Chan**, Course Coordinator & Lecturer

Education

2016 — 2019 **Doctor of Philosophy (Machine Learning)** University of Sydney & Data61, CSIRO

- Advisors: Fabio Ramos (University of Sydney) & Richard Nock (ANU & Data61, CSIRO)
- Experienced in: Approximate Bayesian inference, likelihood-free inference, kernel methods, kernel mean embeddings, hyperparameter learning, Gaussian processes, active learning, Bayesian optimisation, variational inference, neural networks, and deep learning

2011 — 2015 **Bachelor of Engineering (Mechatronic & Space Engineering) (Advanced Stream) & Bachelor of Science (Advanced Mathematics and Statistics)** University of Sydney

Graduated with **University Medal and First Class Honours**

Achievements & Awards

- The **University Medal** is awarded to the **highest achieving graduate** (first place)
- University of Sydney Academic Merit Scholarship & Prize (every year)
- Dean's List of Excellence in Academic Performance (every year)
- First place in several units of study and Top 3 Presenter for Honours Thesis

Projects

- Research Leader in Physics Talent Program on Solar Energy (2014)
- Project Leader in Star Tracker Development with PIC18 microcontroller (2014)
- UAV (Drone) Safety Subsystem with Startup *Flirtey* (2014)
- CubeSat Development under QB50 regulations; Lead Presenter at *AIAA* (2014)
- State and National Finalist in Engineers Without Borders Challenge (2011)

Publications & Others

Kelvin Hsu, Richard Nock, and Fabio Ramos, "Hyperparameter Learning for Conditional Kernel Mean Embeddings with Rademacher Complexity Bounds", *European Conference on Machine Learning (ECML) 2018*, **Best Student Paper Award Winner**

Kelvin Hsu and Fabio Ramos, "Bayesian Learning of Conditional Kernel Mean Embeddings for Automatic Likelihood-Free Inference", *International Conference on Artificial Intelligence and Statistics (AISTATS) 2019* (Tentative Accept)

Kelvin Hsu, Simon O'Callaghan, Alistar Reid, and Stefan Williams, "Informative seafloor exploration using the linearised differential entropy of Gaussian process classifiers", *Australasian Conference on Robotics and Automation (ACRA) 2015*

Languages: Python (`tensorflow`, `torch`, `keras`, `numpy`, `scipy`, `matplotlib`, `seaborn`, `pandas`, `sklearn`, etc), MATLAB, R, C

Hobbies: You can find me busking on the streets of Sydney on weekends with our acoustic band. I sing and play the guitar and keyboard. We also perform at weddings, cafes, and various social events.