Li Kevin Wenliang

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Education

Gatsby Unit, University College London, PhD candidate in machine learning and theoretical neuroscience **2015 – 2020**

- Supervised by **Maneesh Sahani** (primary) and **Peter Dayan** (secondary)
- **Thesis: nonparametric enrichment in computational and biological representation of distributions**
  - Human perception as inference: theory on how the brain may encode uncertainty in the environment
  - State-space models: inference and learning of nonlinear exponential family models
  - Representation learning: probabilistic computation in neural networks by supervised learning
  - Amortised learning: maximum likelihood learning of latent variable models without inference
- **Other research:** Perceptual learning, optimal transport GAN

University of Cambridge, Trinity College Information and Computer Engineering **2010 – 2014**

- B.A. (1st Hon.) and M.Eng. (Distinction), scholarship £18,510 p.a. for four years
- College Senior Scholar, product design competition prize winner
- Ranked within top 10 of the year for 1st, 2nd and 4th years (3rd year at MIT)
- Master thesis: inference and learning on a nonlinear state-space model for neural spiking data, with **Máté Lengyel**

Massachusetts Institute of Technology **2012 – 2013**

- GPA: 4.9/5.0, Cambridge-MIT Exchange in Electrical Engineering and Computer Science.
- Course projects: Shadow removal (image processing), modelling information propagation (network science)
- Research: an automated pipeline for a new peptide synthesis method at the Chemistry department.

Teaching experiences

Neurochat Academy summer school, TA **Jul 2020**

- Teaching computational tools for analysing neural recordings, advice on career and research projects

Machine Learning Summer School (UCL), TA **July 2019**

- Led variational inference tutorial, helped students in all tutorials, organised by **Marc Deisenroth** and **Arthur Gretton**

UCL TAs: probabilistic and unsupervised learning, approximate inference, theoretical neuroscience **Sept 2016 – Jun 2017**

- Marked homework, led tutorials, responded to questions and managed annotated reference list

Research and career experiences

Neurochat, invited talk, Chinese Association for Psychological & Brain Science **Apr 2020**

Neurocomputation and AI in Neuroscience, invited talk, Dynamics in vision and touch (cancelled) **Mar 2020**

DeepMind PhD workshop, UCL, invited talk **Feb 2020**

Brains, Minds and Machines Summer School, MIT/Harvard **Aug 2016**

Project: human perception of object stability, with **Josh Tenenbaum**

Tsinghua University **Dec 2014 – Mar 2015**

Research Intern, 3D object representation on point-cloud data, grasp planning, with **Funchun Sun**

Microsoft Research Cambridge **Jul – Oct 2014**

Research Intern, road network recognition by marked point process, with **Sadia Ahmed** and **Sebastian Nowozin**

Other internship experiences

- Microsoft R&D Shanghai, program manager internship **2013**
- Swiftkey, research in natural language processing for non-whitespace languages, with **Caroline Gasperin** **2011**

Programming: Python (TensorFlow, PyTorch, Caffe), Julia, MatLab, C/C++, Ruby, HTML/CSS, JavaScript

Publications

Referred journal papers:

Li Wenliang, **Aaron Seitz**, *Deep neural network for modelling visual perceptual learning,* Journal of Neuroscience, 18

- Proposed using deep neural network to model behavioural and neural data, designed and conducted experiments, approached Aaron Seitz for collaboration, wrote paper

Referred conference proceedings:

Li K. Wenliang, Theodore Moskovitz, Heishiro Kanagawa, **Maneesh Sahani,** *Amortised learning by wake-sleep*, ICML, 20

- Proposed direct ML gradient approximation with kernel ridge regression and automatic differentiation, designed experiments, conducted all but matrix factorisation experiments, managed collaboration, wrote paper

Li K. Wenliang, **Maneesh Sahani**, *Plausible model for online recognition and postdiction in dynamic environment*, NeurIPS, 19

- Proposed filtering algorithm and temporal features for encoding memory, designed flash-lag effect and occluded tracing experiments, conducted all experiments, wrote paper

Li K. Wenliang*, Dougal Sutherland*, Heiko Strathmann, **Arthur Gretton**, *Learning deep kernels for exponential family densities*, ICML, 19

- Developed meta-learning algorithm for training deep network kernels, design and conducted experiments, discussed normalisability of kernel exponential family distributions and issues of score matching, wrote paper

Chunfang Liu, Wenliang Li, **Funchun Sun**, **Jianwei Zhang**, *Grasp planning by human experience on objects with complex geometry*, IROS, 15

- Proposed a framework to classify objects and identify of graspable part, conducted vision experiments, wrote paper

Referred workshop abstracts:

Li K. Wenliang, Eszter Vértes, **Maneesh Sahani**, *Accurate and adaptive recognition in dynamic environment*, COSYNE, 19

- Proposed biological inference and learning algorithms, designed and conducted experiments, wrote abstract, scored within top 6%

Li K. Wenliang, **Maneesh Sahani**, *Neural network represents uncertainty by nonlinear moments*, COSYNE, 18

- Hypothesised that activations of RNN trained to perform inference represent uncertainty with distributed distributional code, designed and conducted experiments, wrote abstract