Li Kevin Wenliang

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Education

Gatsby Unit, University College London, PhD candidate in machine learning and theoretical neuroscience **2015 – Mar 2021**

- Supervised by **Maneesh Sahani** (primary) and **Peter Dayan** (secondary)
- Thesis: nonparametric enrichment in computational and biological representation of distributions
  - Amortised learning: maximum likelihood learning of latent variable models without inference
  - Density estimation: deep kernel exponential family
  - Human perception as inference: theory on how the brain may encode uncertainty in the environment
  - State-space models: inference and learning of models defined by nonlinear exponential family densities
- Other research: visual perceptual learning, causal optimal transport GAN
- Visits: **Liping Wang** (Chinese Academy of Science), **Zoe Kourtzi** (University of Cambridge)

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 developed at the Chemistry Department.

Research and career experiences

Amazon Web Services, applied scientist intern, with **David Wipf** **Dec 2020 – Present**

CNeuro Summer School, by Tsinghua University **Aug 2020**

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

human perception of object stability, modelled by simulation engines and heuristics, **Josh Tenenbaum**

Tsinghua University, Research Intern **Dec 2014 – Mar 2015**

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

Microsoft Research Cambridge **Jul 2014 – Oct 2014**

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

Microsoft R&D Shanghai, program manager intern **Jul 2013 – Sept 2013**

MeritCo Services, due diligence consulting **Sept 2013**

Swiftkey, research in natural language processing for non-whitespace languages **Jul 2011 – Sept 2011**

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

Teaching experiences

NeuroMatch Academy Summer School, TA **Jul 2020**

- Taught computational tools for analysing neural recordings, adviced on career and research projects

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

- Helped students complete tutorials and answered questions, 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

Publications (with contributions)

Referred journal papers

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

  Modelled behaviour, system and neural data using deep neural network, designed and conducted 2-AFC orientation and face gender discrimination experiments, wrote paper

Referred conference proceedings

- Tianlin Xu*, Li K. Wenliang*, Michael Munn, Beatrice Acciaio, *COT-GAN: Generating sequential data via causal optimal transport*, NeurIPS, 20

  Proposed and analysed a debiasing correction to the Sinkhorn divergence, proposed and conducted most experiments, wrote paper.

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

  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*, NeurIPS, 19

  Online filtering smoothing temporal perceptual memory, designed auditory continuity illusion, 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 trained using small datasets, conducted experiments related to computer vision, wrote paper

Referred workshop abstracts

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

  Proposed biological real-time filtering and learning algorithms based on wake-sleep, 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

Invited Talks

Chinese Institute for Brain Research, Minmin Luo **Jan 2021**

Peking University, Hang Zhang **Oct 2020**

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**

Beijing Normal University, Wu Li's **Jan 2019**