LI KEVIN WENLIANG

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Searching for computational principles of artificial and biological intelligence from a statistical learning perspective

EDUCATION

2015-2021   **Gatsby Unit, University College London**

PhD in Machine Learning and Theoretical Neuroscience

Supervisers: Maneesh Sahani and Peter Dayan

Thesis: Nonparametric Enrichment in Computational and Biological Representation of Distributions

Ongoing work: distributional reinforcement learning, visual perceptual learning, optimal transport

2010-2014   **University of Cambridge, Trinity College**

B.A. (Class I) and M.Eng. (Distinction), Information and Computer Engineering

Supervisor: Máté Lengyel

Scholarship: £18,510 p.a. for four years, Trinity College senior scholar

Ranking: top 10 for 1st, 2nd, and 4th years (3rd year at MIT) out of > 300 students

Master thesis: Inference and Learning on a Nonlinear State-space Model for Spiking Data

2012-2013   **Massachusetts Institute of Technology**

GPA: 4.9/5.0, Cambridge-MIT Exchange in Electrical Engineering and Computer Science.

RESEARCH EXPERIENCE

2020-2021   Institute of Neuroscience, Chinese Academy of Science   Visitor to Liping Wang, sequence perception

2021   Department of Psychology, University of Cambridge   Visitor to Zoe Courtzi, visual perceptual learning

7 / 2016   Brains, Minds and Machines Summer School, Woods Hole   Intuitive physics with Josh Tenenbaum

1-4 / 2015   Tsinghua University, Beijing   Research Assistant in grasp planning with Fuchun Sun

6-9 / 2014   Microsoft Research Cambridge   Research Intern in computer vision with Sebastian Nowozin

Reviewer: NeurIPS 2020 (top 10%), ICML 2021 (expert), ACML 2020, AISTATS 2021, Neurocomputing

CAREER EXPERIENCE

2020-2021   Amazon Web Services, Shanghai   Research Scientist Intern with David Wipf

6-9 / 2013   Microsoft R&D, Shanghai   Program Manager Intern, payment security

6-9 / 2011   Swiftkey (purchased by Microsoft), London   Engineer Intern in natural language processing

TEACHING EXPERIENCE

7 / 2020   NeuroMatch Academy Summer School, online   TA in fundamental theoretical neuroscience

7 / 2019   Machine Learning Summer School, London   TA in fundamental machine learning

2016-2017   Gatsby Unit courses, London   TA in unsupervised learning, theoretical and system neuroscience

INVITED TALKS

3 / 2021   Beijing Normal University (Ke Zhou Lab)   Postdictive inference in perception

1 / 2021   Chinese Institute for Brain Research, Beijing   Nonparametric methods for theoretical neuroscience

3 / 2020   Neurocomputation and AI in Neuroscience, Cambridge   Postdictive inference in perception

SKILLS

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

Language: English, Chinese (trained interpreter)

PUBLICATIONS

Referred journals and conference proceedings

Li K. Wenliang and Aaron Seitz. *Deep neural network for modelling visual perceptual learning.* **Journal of Neuroscience**, 2018

- Proposed using deep neural network to model behavioural and neural data, designed and conducted experiments

Tianlin Xu, Li K. Wenliang, Michael Munn, and Beatrice Acciaio. *COT-GAN: Generating sequential data via causal optimal transport*. **NeurIPS**, 2020

- Proposed and analysed a debiasing correction to the Sinkhorn divergence, proposed and conducted most experiments

Li K. Wenliang, Theodore Moskovitz, Heishiro Kanagawa, and Maneesh Sahani. *Amortised learning by wake-sleep*. **ICML**, 2020

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

Li K. Wenliang and Maneesh Sahani. *Plausible model for online recognition and postdiction in dynamic environment*. **NeurIPS**, 2019

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

Li K. Wenliang*, Dougal Sutherland*, Heiko Strathmann, and Arthur Gretton. *Learning deep kernels for exponential family densities.* **ICML**, 2019

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

Chunfang Liu, Wenliang Li, Funchun Sun, and Jianwei Zhang. *Grasp planning by human experience on objects with complex geometry*. **IROS**, 2015

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

Referred workshop abstracts

Li K. Wenliang, Eszter Vértes and Maneesh Sahani. *Accurate and adaptive recognition in a dynamic environment*. **COSYNE**, 2019

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

Li K. Wenliang and Maneesh Sahani. *Neural network represents uncertainty by nonlinear moments*. **COSYNE**, 2018

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