KAIWEN SHENG

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EDUCATION

University College of London   **London, UK**
MRes in Biosciences, Neuroscience Track   Expected Sept 2022
Peking University   **Beijing, CN**
BS in Computer Science   Jun 2020

PROJECTS

Automatic Parameter Tuning for Detailed Neuron Models   **Jan 2020 - Present**

- Proposed a domain-adaptive and self-trainable (DAST) deep learning framework to infer biophysical and topological properties of neuron, circuit and network.
- Accurately and efficiently inferred biophysical properties of 450+ neurons across 20+ brain regions of the mouse and those of a microcircuit with 3 neurons in *Cancer Borealis*.
- Achieved 100% accuracy in inferring topological synaptic connectivity of a network in CA1 region of the mouse.
- Outperformed SOTA methods in terms of accuracy and sample in efficiency in inferring both biophysical and topological properties.

A Human Perception-based Evaluation Criterion for Cell Membrane Segmentation   **Aug 2020 - Present**

- Pointed out inappropriate criteria for cell membrane segmentation in the machine learning field.
- Helped design, organize perceptual experiments, and analyzed subjects' results of human cell segmentation criterion.
- Participated in designing a new criterion based on human perception and evaluated empirical results.

A General-Purpose Tracker for Animal Behavior Analysis   **Aug 2019 - Present**

- Utilized a pre-trained DNN as the feature extractor and Siamese tracker to perform the tracking procedure, evaluate animal behavior and automatically generate labels for raw video streams.
- Improved accuracy 2-100 times higher than state-of-the-art algorithms.
- Developed a GUI-based toolkit to facilitate non-computer-experts for animal behavior analysis.

Automatic Scheduler for Tensor Operations on Heterogeneous Systems   **Apr 2019 - Aug 2019**

- Scheduled tensor operations under TVM achieving speed 1.83-2.21 times faster than CuDNN and MKL-DNN.
- Hand-crafted tensor operators on GPUs and CPUs to promote performance.
- Performed experiments on heterogeneous systems and analyzed results.
- Published code available on GitHub: https://github.com/KnowingNothing/FlexTensor.

PUBLICATIONS

- **Sheng, K.**, Qu, P., Yang, L., Liu, X., He, L., Ma, L., & Du, K. (2021). A General LSTM-based Deep Learning Method for Estimating Neuronal Models and Inferring Neural Circuitry. *bioRxiv*.
- Su, L., Wang, W., **Sheng, K.**, Liu, X., Du, K., Tian, Y., & Ma, L. (2021). SNAP-Tracker, a model free deep learning tool for animal behavioral tracking. (under review)
- Shi, R., Wang, W., Li, Z., He, L., **Sheng, K.**, Ma, L., ... & Huang, T. (2021). U-RISC: an ultra-high-resolution EM dataset challenging existing deep learning algorithms. *bioRxiv*. (under review)
- Shi, R., Wang, W., Li, Z., He, L., **Sheng, K.**, Ma, L., ... & Huang, T. (2020). Human Perception-based Evaluation Criterion for Ultra-high Resolution Cell Membrane Segmentation. *arXiv preprint arXiv:2010.08209*.
- Zheng, S., Liang, Y., Wang, S., Chen, R., & **Sheng, K.**. (2020, March). FlexTensor: An Automatic Schedule Exploration and Optimization Framework for Tensor Computation on Heterogeneous System. In *Proceedings of the Twenty-Fifth International Conference on Architectural Support for Programming Languages and Operating Systems* (pp. 859-873).

PRESENTATIONS

Posters

- A General LSTM-based Deep Learning Method for Estimating Neuronal Models and Inferring Neural Circuitry, *3rd Chinese Computational and Cognitive Neuroscience Conference*, Shenzhen, China, June 2021.

WORKING EXPERIENCE

Group Leader of Research Group   **Beijing Academy of Artificial Intelligence**
Life Simulation Research Center   Jun 2021 - Sept 2021
- Organized research cooperation among researchers and internships.
- Scheduled weekly discussions on the progress of research projects of the group members.

Software Development Engineer   **Beijing Academy of Artificial Intelligence**
Life Simulation Research Center   Jun 2020 - Sept 2021
- Developed an automatic tool for parameter estimation and optimization for computational neural models.
- Published a preprint paper of the tool on bioRxiv.

TEACHING EXPERIENCE

Compiler Practice   **Peking University**
Teaching Assistant   Feb 2020 - Jun 2020
- Guided students to work through each stage of compiler design, including symbol table construction, type check, intermediate representation generation, register allocation.

Algorithm Design and Analysis Seminar   **Peking University**
Teaching Assistant   Feb 2019 - Jun 2019
- Provided references on reinforcement learning as supplementary material and designed exam papers.

LEADERSHIPS

Badminton Association in Peking University   **Peking University**
President   Sept 2019 - Jun 2020
- Organized badminton competitions at Peking University and scheduled friendly matches among colleges.
- Popularized badminton through social media at Peking University.

Badminton Team of Peking University   **Peking University**
Captain   Sept 2019 - Jun 2020
- Led weekly training and participated in competitions.

AWARDS

Yanhong Li Scholarship of Peking University	Sept 2019
Excellent Research of Peking University	Sept 2019
Ke Chuanglong Scholarship of Peking University	Sept 2018
Merited Student of Peking University	Sept 2018 & Sept 2017
May Fourth Scholarship of Peking University	Sept 2017

SKILLS

Languages	Python, C, C++, Java, MATLAB
Simulator	NEURON, NEST
Other	LaTex, Git