Jingling Li

jingling@cs.umd.edu • +1 (484) 620-1749 • https://scholar.google.com/citations?user=9TbXgQ0AAAAJ

EDUCATION

University of Maryland, College Park, Maryland, USA

- Ph.D. in Computer Science — Sep 2017 – May 2023 (Expected)
  - Research Interests: Graph Neural Networks, Representation Learning, Reinforcement Learning, Deep Learning
  - Related Courses: Convex Optimization, Spectral Methods and Reinforcement Learning, AI Planning, Advanced Numerical Optimization, Probability Theory, Algorithmic Lower Bounds, Quantum Information Processing
  - Advisors: John Dickerson

Bryn Mawr College, Bryn Mawr, Pennsylvania, USA

- B.A., Honours in Computer Science and Mathematics, *magna cum laude* — Sep 2013 – May 2017
  - Cumulative GPA: 3.92 / 4.00
  - Computer Science Thesis: "Modified Conversion Algorithm for Quadrilateral Meshes Generation"
  - Mathematics Thesis: "Well-Quasi-Ordering and its Relation to Terminating Rewrite System."

WORK EXPERIENCE

DeepMind, London, UK — Jun 2021 – Present

- Research Scientist Intern (remote), hosted by Petar Veličković
  - Investigating how the inductive bias in architectures could help speed up current reinforcement learning algorithms and improve their generalization performance.

Vector Institute, University of Toronto, Ontario, Canada — Jun 2020 – Mar 2021

- Research Intern (remote), hosted by Jimmy Ba
  - Investigated the role of architectural inductive bias in learning with noisy labels.
  - Publication accepted by 35th Conference on Neural Information Processing Systems (NeurIPS).

JPMorgan, New York, New York, USA — May 2019 – Aug 2019

- Research Intern at JPMorgan AI Research Team

Facebook, Menlo Park, California, USA — May 2017 – Aug 2017

- Back End Software Engineer Intern, Ads Identity team
  - Designed and built a new framework to optimize the retrieval time of obtaining all targeted audience for queries on existing Ad products. This framework is expected to speed up 90% of the current queries.

GRADUATE RESEARCH EXPERIENCE

University of Maryland, College Park, Maryland, USA

- Topic: Neural Network's Architecture Impact its Robustness to Noisy Labels — Sep 2020 – May 2021
  - Theoretically and experimentally identified conditions under which noisy label training could induce good representations. Such representations exist even for models that generalize poorly.
  - Proposed a simple and intuitive method to utilize the induced representation, which achieves the state-of-the-art results on several benchmark datasets on image classification tasks.

- Topic: How Neural Networks Extrapolate Out-of-Distribution? — Jan 2020 – Nov 2020
  - Explained what neural networks learn outside the support of training distribution.
  - Identified conditions under which multilayer perceptrons and graph neural networks extrapolate well.
  - Publication accepted by Nineth International Conference on Learning Representations (ICLR) (oral presentation)
  - Collaborators: Keyulu Xu, Mozhi Zhang, Simon S. Du, Ken-ichi Kawarabayashi, Stefanie Jegelka

- Topic: What Can Neural Networks Reason About? — Feb 2019 – Dec 2019
  - Developed a theoretical framework, algorithmic alignment, to characterize which tasks a neural network can learn well by analyzing how its structure aligns with the underlying reasoning procedures.
  - The theoretical analysis revealed that graph neural networks algorithmically align with dynamic programming (DP) and we show DP unifies a broad range of reasoning tasks.
  - Publication accepted by Eighth International Conference on Learning Representations (ICLR) (spotlight presentation)
  - Collaborators: Keyulu Xu, Mozhi Zhang, Simon S. Du, Ken-ichi Kawarabayashi, Stefanie Jegelka

- Topic: Understanding of Generalization in Deep Learning via Tensor Methods — Jun 2018 – May 2019
  - Identified new properties of a neural network that better characterize its generalization ability and derived theoretical analysis based on these new properties using tensor methods.

- Provided a practical approach to improve the generalizability and robustness of neural network architectures.
- Publication accepted by the 23rd International Conference on Artificial Intelligence and Statistics (AISTATS)
- Advisors: Furong Huang, Taiji Suzuki (Continuation of the research project at RIKEN AIP)

RIKEN Center for Advanced Intelligence Project (AIP), Tokyo, Japan Jun 2018 – Jan 2019

- Research Intern, Deep Learning Theory Team
  - Investigated different approaches for analyzing the generalization properties of well-trained neural networks, and surveyed current tensor decomposition approaches that have theoretical guarantees
  - Provided theoretical analysis to better understand generalization in deep neural networks via tensor methods.
  - Advisor: Taiji Suzuki

SELECTED PUBLICATIONS

How does a Neural Network's Architecture Impact its Robustness to Noisy Labels? Jingling Li, Keyulu Xu, Mozhi Zhang, John Dickerson, Jimmy Ba. *In Proceedings of Thirty-fifth Conference on Neural Information Processing Systems (NeurIPS)*, 2021.

VQ-GNN: A Universal Framework to Scale up Graph Neural Networks using Vector Quantization. Mucong Ding, Kezhi Kong, Jingling Li, Chen Zhu, John P Dickerson, Furong Huang, Tom Goldstein. *In Proceedings of Thirty-fifth Conference on Neural Information Processing Systems (NeurIPS)*, 2021.

How Neural Networks Extrapolate: From Feedforward to Graph Neural Networks. Keyulu Xu, Mozhi Zhang, Jingling Li, Simon S. Du, Ken-ichi Kawarabayashi, Stefanie Jegelka. *In International Conference on Learning Representations (ICLR)*, 2021. (**Oral Presentation**).

What Can Neural Networks Reason About? Keyulu Xu, Jingling Li, Mozhi Zhang, Simon S. Du, Ken-ichi Kawarabayashi, Stefanie Jegelka. *In International Conference on Learning Representations (ICLR)*, 2020. (**Spotlight Presentation**).

Understanding Generalization in Deep Learning via Tensor Methods. Jingling Li, Yanchao Sun, Jiahao Su, Taiji Suzuki, Furong Huang. *In Proceedings of the Twenty Third International Conference on Artificial Intelligence and Statistics (AISTATS)*, 2020.

Select and Permute: An Improved Online Framework for Scheduling to Minimize Weighted Completion Time. Samir Khuller*, Jingling Li*, Pascal Sturmfels*, Kevin Sun*, and Prayaag Venkat*. *In Theoretical Computer Science* 795 (2019): 420-431.

*Alphabetical order

AWARDS & SCHOLARSHIPS

- Dean's Fellowship, University of Maryland 2017 – 2019
  Two year merit-based fellowship for selected PhD students
- Lora Tong Lee Memorial Scholarship, Bryn Mawr College 2013 – 2017
  Awarded annually by the Lee Foundation, Singapore to one Chinese student for tuition, room and board.
- CRA-W Grace Hopper Celebration Research Scholar 2016

ACADEMIC SERVICE

I have served as a reviewer for ICML (2019-2021), NeurIPS (2019-2021), ICLR (2021-2022), CVPR (2021), ICCV (2021), IEEE TNNLS (2019), and JMLR (2020).

PROGRAMMING SKILLS

Proficient in Python, C/C++, Java, and MATLAB. Familiar with SQL and R.