Ziqiao Wang

Curriculum Vitae

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ziqiaowanggeothe.github.io

Education

2019–Present **Ph.D, University of Ottawa**, *Ottawa, Ontario, Canada*, (Expected Jan. 2024).
Electrical and Computer Engineering
Thesis: "Generalization in Machine Learning through Information-Theoretic Lens"
Advisor: Prof. Yongyi Mao

2017–2018 **M.A.Sc, University of Ottawa**, *Ottawa, Ontario, Canada*.
Electrical and Computer Engineering
Advisor: Prof. Yongyi Mao

2013–2017 **B.Eng, North China Electric Power University (NCEPU)**, *Baoding, Hebei, China*.
Electrical Engineering and its Automation
Advisor: Prof. Xiangyu Zhang

Research Interests

- **Area:** Machine Learning, Statistical Learning Theory, Information Theory
- **Topics:** Generalization, Domain Adaptation, Trustworthy Machine Learning, Reinforcement Learning, Online Learning

Employment

Jan. 2020 - Present **University of Ottawa**, *Ottawa, Canada*.
Research Assistant
Mentor: Dr. Yongyi Mao

May 2019 - Dec. 2019 **National Research Council Canada (NRC)**, *Ottawa, Canada*.
Research Intern at Digital Technologies Research Centre
Mentor: Dr. Harry H.Y. Guo

Jul. 2017 - Aug. 2017 **Tsintergy Technology Co., Ltd.**, *Beijing, China*.
Intern of Electricity Market and Energy Internet

Publications & Preprints

* denotes equal contribution.

Conference Proceedings

C1 **Ziqiao Wang** and Yongyi Mao. "Sample-Conditioned Hypothesis Stability Sharpens Information-Theoretic Generalization Bounds." *Advances in Neural Information Processing Systems (NeurIPS), 2023.*

C2 **Ziqiao Wang** and Yongyi Mao. "Tighter Information-Theoretic Generalization Bounds from Supersamples." *International Conference on Machine Learning (ICML), 2023* **(Oral Presentation, top 2.2% of submissions)**.

C3 Zixuan Liu*, **Ziqiao Wang***, Hongyu Guo and Yongyi Mao. "Over-Training with Mixup May Hurt Generalization." *International Conference on Learning Representations (ICLR), 2023.*

C4 **Ziqiao Wang** and Yongyi Mao. "Information-Theoretic Analysis of Unsupervised Domain Adaptation." *International Conference on Learning Representations (ICLR), 2023.*

C5 **Ziqiao Wang** and Yongyi Mao. "On the Generalization of Models Trained with SGD: Information-Theoretic Bounds and Implications." *International Conference on Learning Representations (ICLR), 2022.*

Workshop Papers

W1 **Ziqiao Wang** and Yongyi Mao. "Two Facets of SDE Under an Information-Theoretic Lens: Generalization of SGD via Training Trajectories and via Terminal States." *Mathematics of Modern Machine Learning (M3L) Workshop at NeurIPS 2023.*

W2 Zixuan Liu*, **Ziqiao Wang***, Hongyu Guo and Yongyi Mao. "Over-Training with Mixup May Hurt Generalization." *First Workshop on Interpolation Regularizers and Beyond at NeurIPS 2022.*

Preprints

P1 **Ziqiao Wang** and Yongyi Mao. "Two Facets of SDE Under an Information-Theoretic Lens: Generalization of SGD via Training Trajectories and via Terminal States." *Under Review at ICLR 2024.*

P2 Fanshuang Kong, Richong Zhang, **Ziqiao Wang** and Yongyi Mao. "On Unsupervised Domain Adaptation: Pseudo Label Guided Mixup for Adversarial Prompt Tuning." *Under Review at AAAI 2024.*

P3 Hailang Huang, Zhijie Nie, **Ziqiao Wang** and Ziyu Shang"Cross-modal and Uni-modal Soft-label Alignment for Image-Text Retrieval." *Under Review at AAAI 2024.*

P4 **Ziqiao Wang** and Yongyi Mao. "f-Divergence Guided Unsupervised Domain Adaptation: Two Theoretical Viewpoints." *In Submission.*

P5 **Ziqiao Wang**, Yongyi Mao, Hongyu Guo and Richong Zhang. "On SkipGram Word Embedding Models with Negative Sampling: Unified Framework and Impact of Noise Distributions." *arXiv preprint arXiv:2009.04413, 2020.*

Honors & Awards

2023 ICLR Travel Award ($1,000$ USD)

2022-now INTER-MATH-AI Stipends from the NSERC CREATE program ($20,000$ CAD/Year)

2021-now Doctorate Admission Scholarship from University of Ottawa ($9,000$ CAD/Year)

2019-now International Doctoral Scholarship from University of Ottawa ($10,500$ CAD/Year)

2016 Merit Student of NCEPU

First-class Scholarship from NCEPU ($3,000$ RMB)

First Prize of The Electrician Mathematical Contest in Modeling (EMCM)

Meritorious Winner of 2016 Interdisciplinary Contest in Modeling (ICM)

2015 Meritorious Winner of 2015 Mathematical Contest in Modeling (MCM)

Second Prize of China Undergraduate Mathematical Contest in Modeling (CUMCM)

Selected Talks

2023 **Tighter Information-Theoretic Generalization Bounds from Supersamples**.

- INTER-MATH-AI (IMA) Annual Workshop, *Station de biologie des Laurentides, St-Hippolyte, Canada, Aug. 2023*
- The 40th International Conference on Machine Learning (ICML 2023), *Honolulu, Hawaii, USA, Jul. 2023*
- Prof. Richong Zhang's research group, *Beihang University, Beijing, China, Jul. 2023*

Over-Training with Mixup May Hurt Generalization.

- "AI4D: The Science" seminar at National Research Council Canada, *Virtual, Apr. 2023*

Information-Theoretic Analysis of Unsupervised Domain Adaptation.

- Machine Learning Seminar at Department of Mathematics and Statistics, *University of Ottawa, Canada, Jan. 2023*

2019-2022 **On the Generalization of Models Trained with SGD: Information-Theoretic Bounds and Implications**.

- Prof. Yong Liu's research group (Gaoling School of Artificial Intelligence, Remin University of China), *Virtual, Jul. 2022*
- AI TIME (Department of Computer Science and Technology, Tsinghua University), *Virtual, Jun. 2022*
- "AI4D: The Science" seminar at National Research Council Canada, *Virtual, Dec. 2021*

On SkipGram Word Embedding Models with Negative Sampling: Unified Framework and Impact of Noise Distributions.

- The Text Analysis and Machine Learning (TAMALE) seminar, *University of Ottawa, Canada, Nov. 2019*

Professional Service

Conference Reviewer: NeurIPS, ICLR, AISTATS

Journal Reviewer: IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI)

Workshop Reviewer: Neural Compression Workshop at ICML 2023

Program Committee: The 2024 IEEE North American School of Information Theory (NASIT)

Teaching Experience

2018– 2023 **Teaching Assistant**, *University of Ottawa*.

CSI 5138/5340[R00] Introduction to Deep Learning and Reinforcement Learning (2018-2019, 2021-2023)
ELG 5170[A00] Information Theory (2020)
GNG 1106[A00] Fundamentals of Engineering Computation (2020-2021, 2023)