

Ziqiao Wang

Curriculum Vitae

✉ ziqiaowang@tongji.edu.cn
📁 ziqiaowanggeothe.github.io

Employment

- Sep. 2024 - **Assistant Professor**, School of Computer Science and Technology, Tongji University, *Shanghai, China*.
Now
- May 2019 - **Research Intern**, Digital Technologies Research Centre, National Research Council Canada (NRC),
Dec. 2019 *Ottawa, Canada*.
Mentor: Dr. Harry H.Y. Guo

Education

- Jan. 2019 - **Ph.D, University of Ottawa, Ottawa, Ontario, Canada**.
May 2024 Electrical and Computer Engineering
Thesis: "Generalization in Machine Learning through Information-Theoretic Lens"
Advisor: Yongyi Mao
Committee: Maia Fraser, Tommaso R. Cesari, James R. Green, Ashish Khisti
- Sep. 2017 - **M.A.Sc, University of Ottawa, Ottawa, Ontario, Canada**.
Dec. 2018 Electrical and Computer Engineering
Advisor: Yongyi Mao
- Sep. 2013 - **B.Eng, North China Electric Power University (NCEPU), Baoding, Hebei, China**.
Jun. 2017 Electrical Engineering and its Automation
Advisor: Xiangyu Zhang

Research Interests

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

Publications & Preprints

* denotes equal contribution.

- Preprints P1 Fanshuang Kong, Richong Zhang, Xiaohui Guo, Junfan Chen, and **Ziqiao Wang**. "Preserving Label Correlation for Multi-label Text Classification by Prototypical Regularizations." *Submitted*.
- P2 Haiyun He, Yepeng Liu, **Ziqiao Wang**, Yongyi Mao and Yuheng Bu. "Universally Optimal Watermarking Schemes for LLMs: from Theory to Practice." *Submitted*.
- P3 Fanshuang Kong, Richong Zhang and **Ziqiao Wang**. "Activated Parameter Locating via Causal Intervention for Model Merging." *Submitted*.
- P4 Hailang Huang, Richong Zhang, Zhijie Nie and **Ziqiao Wang**. "Cluster-based Absent Label Completion for Image-Text Retrieval." *Submitted*.
- P5 Fanshuang Kong, Richong Zhang and **Ziqiao Wang**. "LH-Mix: Local Hierarchy Correlation Guided Mixup over Hierarchical Prompt Tuning." *Submitted*.
- P6 **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*.

- Conference C1 **Ziqiao Wang** and Yongyi Mao. "Generalization Bounds via Conditional f -Information." *Advances in Neural Information Processing Systems (NeurIPS)*, 2024.
- C2 **Ziqiao Wang** and Yongyi Mao. "On f -Divergence Principled Domain Adaptation: An Improved Framework." *Advances in Neural Information Processing Systems (NeurIPS)*, 2024.
- C3 **Ziqiao Wang** and Yongyi Mao. "Two Facets of SDE Under an Information-Theoretic Lens: Generalization of SGD via Training Trajectories and via Terminal States." *Proceedings of the Fortieth Conference on Uncertainty in Artificial Intelligence (UAI)*, 2024.
- C4 Fanshuang Kong, Richong Zhang, **Ziqiao Wang** and Yongyi Mao. "On Unsupervised Domain Adaptation: Pseudo Label Guided Mixup for Adversarial Prompt Tuning." *Proceedings of the AAAI Conference on Artificial Intelligence (AAAI)*, 2024.
- C5 Hailang Huang, Zhijie Nie, **Ziqiao Wang** and Ziyu Shang. "Cross-modal and Uni-modal Soft-label Alignment for Image-Text Retrieval." *Proceedings of the AAAI Conference on Artificial Intelligence (AAAI)*, 2024.
- C6 **Ziqiao Wang** and Yongyi Mao. "Sample-Conditioned Hypothesis Stability Sharpens Information-Theoretic Generalization Bounds." *Advances in Neural Information Processing Systems (NeurIPS)*, 2023.
- C7 **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**).
- C8 Zixuan Liu*, **Ziqiao Wang***, Hongyu Guo and Yongyi Mao. "Over-Training with Mixup May Hurt Generalization." *International Conference on Learning Representations (ICLR)*, 2023.
- C9 **Ziqiao Wang** and Yongyi Mao. "Information-Theoretic Analysis of Unsupervised Domain Adaptation." *International Conference on Learning Representations (ICLR)*, 2023.
- C10 **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 W1 **Ziqiao Wang** and Yongyi Mao. "On f -Divergence Principled Domain Adaptation: An Improved Framework." *18th Canadian Workshop on Information Theory (CWIT)*, 2024.
- Papers W2 **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*.
- W3 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*.

Honors & Awards

- 2024 Top 10% Reviewers Award at NeurIPS 2024
 UAI 2024 Scholarship
 Governor General's Academic Medal (Nominee for Spring 2025 Convocation)
 Pierre Laberge Thesis Prize (Nominee for Spring 2025 Convocation)
- 2023 Top 10% Reviewers Award at NeurIPS 2023
 ICLR 2023 Travel Award
- 2022-2024 INTER-MATH-AI Stipends from the NSERC CREATE program
- 2021-2024 Doctorate Admission Scholarship from University of Ottawa
- 2019-2024 International Doctoral Scholarship from University of Ottawa

- 2016 Merit Student of NCEPU
 First-class Scholarship from NCEPU
 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

- 2024 **Variational Representation of f -divergence and Its Applications: DA Theorey and CMI Generalization Bounds.**
 ◦ Prof. Yong Liu's research group (Remin University of China), *Virtual*, Oct. 2024
- 2023 **Tutorial on Information-Theoretic Generalization Bounds.**
 ◦ Prof. Yong Liu's research group (Remin University of China), *Virtual*, Dec. 2023
- Tighter Information-Theoretic Generalization Bounds from Supersamples.**
 ◦ INTER-MATH-AI 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 (2023, 2024), ICML (2024), ICLR (2024, 2025), AISTATS (2024,2025), AACL (2025), IJCAI (2024), ISIT (2024), Neural Compression Workshop at ICML 2023
- Journal Reviewer** IEEE Transactions on Information Theory (TIT), Transactions on Machine Learning Research (TMLR), IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI), IEEE Journal on Selected Areas in Information Theory (JSAIT)
- Organizers** 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)