Ziqiao Wang

Curriculum Vitae

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Employment

Sep. 2024 - Now **Assistant Professor**, School of Computer Science and Technology, Tongji University, *Shanghai, China*.

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

Education

Jan. 2019 - May 2024 **Ph.D, University of Ottawa**, *Ottawa, Ontario, Canada*.
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 - Dec. 2018 **M.A.Sc, University of Ottawa**, *Ottawa, Ontario, Canada*.
Electrical and Computer Engineering
Advisor: Yongyi Mao

Sep. 2013 - Jun. 2017 **B.Eng, North China Electric Power University (NCEPU)**, *Baoding, Hebei, China*.
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 Proceedings

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 Papers

W1 **Ziqiao Wang** and Yongyi Mao. "On f-Divergence Principled Domain Adaptation: An Improved Framework." *18th Canadian Workshop on Information Theory (CWIT), 2024.*

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 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), AAAI (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)