

# Ziqiao Wang

## Curriculum Vitae

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### 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 – **University of Ottawa, Ottawa, Canada**.  
Present Research Assistant  
Mentor: Dr. Yongyi Mao
- May 2019 – **National Research Council Canada (NRC), Ottawa, Canada**.  
Dec. 2019 Research Intern at Digital Technologies Research Centre  
Mentor: Dr. Harry H.Y. Guo
- Jul. 2017 – **Tsintergy Technology Co., Ltd., Beijing, China**.  
Aug. 2017 Intern of Electricity Market and Energy Internet

### Publications & Preprints

\* denotes equal contribution.

- Conference C1 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.
- C2 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.
- C3 **Ziqiao Wang** and Yongyi Mao. “Sample-Conditioned Hypothesis Stability Sharpens Information-Theoretic Generalization Bounds.” *Advances in Neural Information Processing Systems (NeurIPS)*, 2023.
- C4 **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**).

- C5 Zixuan Liu\*, **Ziqiao Wang**\*, Hongyu Guo and Yongyi Mao. "Over-Training with Mixup May Hurt Generalization." *International Conference on Learning Representations (ICLR)*, 2023.
- C6 **Ziqiao Wang** and Yongyi Mao. "Information-Theoretic Analysis of Unsupervised Domain Adaptation." *International Conference on Learning Representations (ICLR)*, 2023.
- C7 **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. "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 **Ziqiao Wang** and Yongyi Mao. " $f$ -Divergence Guided Unsupervised Domain Adaptation: Two Theoretical Viewpoints." *In Submission*.
- P3 **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 Top Reviewer Award at NeurIPS 2023  
ICLR 2023 Travel Award
- 2022-now INTER-MATH-AI Stipends from the NSERC CREATE program
- 2021-now Doctorate Admission Scholarship from University of Ottawa
- 2019-now 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

- 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 (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

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## Professional Service

**Conference Reviewer:** NeurIPS, ICML, ICLR, AISTATS

**Journal Reviewer:** IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI), IEEE Journal on Selected Areas in Information Theory (JSAIT)

**Workshop Reviewer:** Neural Compression Workshop at ICML 2023

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

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## 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)