

YIFEI WANG

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EDUCATION

Peking University, School of Mathematical Sciences 09 2017 – 07 2023
Ph.D. in Applied Mathematics Beijing, China

Advisors: Yisen Wang, Jiansheng Yang, Zhouchen Lin

Peking University, School of Mathematical Sciences 09 2013 – 07 2017
Bachelor of Science (Major) Beijing, China

Peking University, Department of Philosophy 09 2014 – 07 2017
Bachelor of Art (Minor) Beijing, China

SELECTED HONORS AND AWARDS

- **Best Machine Learning Paper Award** (1/685), ECML-PKDD, 2021
- **Silver Best Paper Award**, ICML AML workshop, 2021
- **Excellent Graduate of Beijing**, 2023
- **Excellent Graduate of Peking University**, 2023
- **National Scholarship**, 2021 & 2022
- **Principal Scholarship**, 2022
- **Baidu Scholarship Nomination Award** (20 worldwide), Baidu Inc, 2022
- **Meritorious Winner (First Prize)**, Mathematical Contest in Modeling, 2016

RESEARCH INTERESTS

I am generally interested in understanding the underlying mechanisms of machine learning models and improving their robustness in real-world applications. Now I mainly work on the following areas:

- **Self-Supervised Learning**: how to learn meaningful representations from unlabeled data in a principled way;
- **Robust Learning**: how to ensure robust performance under real-world distribution shifts;
- **Graph Learning**: how to efficiently learn from structured graph data while respecting data symmetry.

PUBLICATIONS

*: equal contribution (SSL) Self-Supervised Learning (ROB) Robust Learning (GRAPH) Graph Learning

[**NeurIPS'23**] *Balance, Imbalance, and Rebalance: Understanding Robust Overfitting from a Minimax Game Perspective* (ROB) 2023
• Yifei Wang*, Liangchen Li, Yisen Wang
• 37th Conference on Neural Information Processing Systems (NeurIPS 2023)

[**NeurIPS'23**] *Adversarial Examples Are Not Real Features* (SSL) (ROB) 2023
• Ang Li*, Yifei Wang*, Yisen Wang
• 37th Conference on Neural Information Processing Systems (NeurIPS 2023)

[**NeurIPS'23**] *Laplacian Canonization: A Minimalist Approach to Sign and Basis Invariant Spectral Embedding* (GRAPH) 2023
• George Ma*, Yifei Wang*, Yisen Wang
• 37th Conference on Neural Information Processing Systems (NeurIPS 2023)

- [**NeurIPS'23**] *Architecture Matters: Uncovering Implicit Mechanisms in Graph Contrastive Learning* (SSL) (GRAPH) 2023
- Xiaojun Guo*, **Yifei Wang***, Zeming Wei, Yisen Wang
 - 37th Conference on Neural Information Processing Systems (NeurIPS 2023)
- [**NeurIPS'23**] *Tri-contrastive Learning: Identifiable Representation Learning with Automatic Discovery of Feature Importance* (SSL) 2023
- Qi Zhang*, **Yifei Wang***, Yisen Wang
 - 37th Conference on Neural Information Processing Systems (NeurIPS 2023)
- [**ICML'23**] *On the Generalization of Multi-modal Contrastive Learning* (SSL) 2023
- Qi Zhang*, **Yifei Wang***, Yisen Wang
 - 40th International Conference on Machine Learning (ICML 2023)
- [**ICML'23**] *Rethinking Weak Supervision in Helping Contrastive Representation Learning* (SSL) 2023
- Jingyi Cui*, Weiran Huang*, **Yifei Wang***, Yisen Wang
 - 40th International Conference on Machine Learning (ICML 2023)
- [**CVPR'23**] *CFA: Class-wise Calibrated Fair Adversarial Training* (ROB) 2023
- Zeming Wei, **Yifei Wang**, Yiwon Guo, Yisen Wang
 - The IEEE / CVF Computer Vision and Pattern Recognition Conference (CVPR 2023)
- [**IEEE TIP**] *Equilibrium Image Denoising with Implicit Differentiation* (SSL) 2023
- Qi Chen, **Yifei Wang**, Zhengyang Geng, Yisen Wang, Jiansheng Yang, and Zhouchen Lin
 - IEEE Transactions on Image Processing (TIP)
- [**ICLR'23**] *A Message Passing Perspective on Learning Dynamics of Contrastive Learning* (SSL) (GRAPH) 2023
- **Yifei Wang***, Qi Zhang*, Tianqi Du, Jiansheng Yang, Zhouchen Lin, Yisen Wang
 - 11th International Conference on Learning Representations (ICLR 2023)
- [**ICLR'23**] *Towards a Unified Theoretical Understanding of Non-contrastive Learning via Rank Differential Mechanism* (SSL) 2023
- Zhijian Zhuo*, **Yifei Wang***, Yisen Wang
 - 11th International Conference on Learning Representations (ICLR 2023)
- [**ICLR'23**] *Rethinking the Effect of Data Augmentation in Adversarial Contrastive Learning* (SSL) (ROB) 2023
- Rundong Luo*, **Yifei Wang***, Yisen Wang
 - 11th International Conference on Learning Representations (ICLR 2023)
- [**ICLR'23**] *ContraNorm: A Contrastive Learning Perspective on Oversmoothing and Beyond* (SSL) (GRAPH) 2023
- Xiaojun Guo*, **Yifei Wang***, Tianqi Du, Yisen Wang
 - 11th International Conference on Learning Representations (ICLR 2023)
- [**ICLR'23**] *Unbiased Stochastic Proximal Solver for Graph Neural Networks with Equilibrium States* (GRAPH) 2023
- Mingjie Li, **Yifei Wang**, Yisen Wang, Zhouchen Lin
 - 11th International Conference on Learning Representations (ICLR 2023)
- [**ME-FoMo-ICLR'23**] *What Contrastive Learning Learns Beyond Class-wise Features?* (SSL) 2023
- Xingyuming Liu, **Yifei Wang**, Yisen Wang
 - ICLR 2023 Workshop on Mathematical and Empirical Understanding of Foundation Models (ME-FoMo)
- [**BANDS-ICLR'23**] *Rethinking the Necessity of Labels in Backdoor Defense* (ROB) 2023
- Zidi Xiong, Dongxian Wu, **Yifei Wang**, Yisen Wang
 - ICLR 2023 Workshop on Backdoor Attacks and Defenses in Machine Learning (BANDS)
- [**AAAI'23 Oral**] *On the Connection between Invariant Learning and Adversarial Training for OOD Generalization* (ROB) 2023
- Shiji Xin, **Yifei Wang**, Jingtong Su, Yisen Wang
 - 37th AAAI Conference on Artificial Intelligence (AAAI 2023). Oral Presentation.
- [**NeurIPS'22 Spotlight**] *How Mask Matters: Towards Theoretical Understandings of Masked Autoencoders* (SSL) 2022
- Qi Zhang*, **Yifei Wang***, Yisen Wang
 - 36th Conference on Neural Information Processing Systems (NeurIPS 2022). Spotlight Presentation

- [**NeurIPS'22 Spotlight**] *Improving Out-of-distribution Robustness by Adversarial Training with Structured Priors* (ROB) 2022
- Qixun Wang*, Yifei Wang*, Hong Zhu, Yisen Wang
 - 36th Conference on Neural Information Processing Systems (NeurIPS 2022). Spotlight Presentation
- [**NeurIPS'22 Spotlight**] *When Adversarial Training Meets Vision Transformers: Recipes from Training to Architecture* (ROB) 2022
- Yichuan Mo, Dongxian Wu, Yifei Wang, Yiwen Guo, Yisen Wang
 - 36th Conference on Neural Information Processing Systems (NeurIPS 2022). Spotlight Presentation
- [**SSL-NeurIPS'22**] *Variational Energy-Based Models: A Probabilistic Framework for Contrastive Self-Supervised Learning* (SSL) 2022
- Tianqi Du*, Yifei Wang*, Yisen Wang
 - NeurIPS 2022 Workshop: Self-Supervised Learning - Theory and Practice
- [**SSL-NeurIPS'22 Oral**] *AggNCE: Asymptotically Identifiable Contrastive Learning* (SSL) 2022
- Jingyi Cui*, Weiran Huang*, Yifei Wang, Yisen Wang
 - NeurIPS'22 Workshop: Self-Supervised Learning - Theory and Practice. Oral Representation
- [**BigData'22 Long Talk**] *Efficient and Scalable Implicit Graph Neural Networks with Virtual Equilibrium* (GRAPH) 2022
- Qi Chen, Yifei Wang, Yisen Wang, Jianlong Chang, Qi Tian, Jiansheng Yang, Zhouchen Lin
 - The IEEE International Conference on Big Data 2022 (**IEEE BigData 2022**). Long Talk
- [**ICML'22**] *Optimization-induced Graph Implicit Nonlinear Diffusion* (GRAPH) 2022
- Qi Chen, Yifei Wang, Yisen Wang, Zhouchen Lin
 - 39th International Conference on Machine Learning (ICML 2022)
- [**ICML'22**] *G²CN: Graph Gaussian Convolution Networks with Concentrated Graph Filters* (GRAPH) 2022
- Mingjie Li, Xiaojun Guo, Yifei Wang, Yisen Wang, Zhouchen Lin
 - 39th International Conference on Machine Learning (ICML 2022)
- [**ICLR'22**] *Chaos is a Ladder: A New Theoretical Understanding of Contrastive Learning via Augmentation Overlap* (SSL) 2022
- Yifei Wang*, Qi Zhang*, Yisen Wang, Jiansheng Yang, Zhouchen Lin
 - 10th International Conference on Learning Representations (ICLR 2022)
- [**ICLR'22**] *A Unified Contrastive Energy-based Model for Understanding the Generative Ability of Adversarial Training* (SSL) (ROB) 2022
- Yifei Wang, Yisen Wang, Jiansheng Yang, Zhouchen Lin
 - 10th International Conference on Learning Representations (ICLR 2022)
 - ICML 2021 Workshop: The Prospects and Perils of Adversarial Machine Learning. Won **Silver Best Paper Award**
- [**NeurIPS'21**] *Residual Relaxation for Multi-view Representation Learning* (SSL) 2021
- Yifei Wang, Zhengyang Geng, Feng Jiang, Chuming Li, Yisen Wang, Jiansheng Yang, Zhouchen Lin
 - 35th Conference on Neural Information Processing Systems (NeurIPS 2021)
- [**NeurIPS'21**] *Dissecting the Diffusion Process in Linear Graph Convolutional Networks* (GRAPH) 2021
- Yifei Wang, Yisen Wang, Jiansheng Yang, Zhouchen Lin
 - 35th Conference on Neural Information Processing Systems (NeurIPS 2021)
- [**ECML-PKDD'21 Best ML Paper**] *Reparameterized Sampling for Generative Adversarial Networks* (SSL) 2021
- Yifei Wang, Yisen Wang, Jiansheng Yang, Zhouchen Lin
 - European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases (ECML-PKDD 2021). **Best Machine Learning Paper Award (1/685)**. Invited to **Machine Learning Journal**

INTERNSHIP

Baidu's Phoenix Nest
Research Intern

09 2018 – 03 2019
Beijing, China

- Research on end-to-end AD selection with Reinforcement Learning and Transformer.

ROLES AND RESPONSIBILITIES

- Conference Reviewer: ICML (2022), NeurIPS (2022), NeurIPS (2023), ICLR (2022), ACL (2021, 2022), CVPR (2023), ICCV (2023), ECML-PKDD (2022)
- TA, **Optimization Methods in Machine Learning**, 2018. Instructor: Zhouchen Lin
- TA, **Advanced Mathematics**, 2019. Instructor: Chao Wang
- TA, **Introduction to Artificial Intelligence (Trustworthy ML Class)**, 2020, 2022. Instructor: Yisen Wang

TALKS

- **Understanding and Applying Self-supervised Learning via Graph**. Invited Talk at Deep Potential. 2023.
- **Towards Theoretical Foundations of Self-Supervised Learning**. Invited Talk at KAIST. 2022.
- **Towards Truly Unlearnable Examples for Data Privacy**. Invited Talk at Chinese Academy of Science. 2022.
- **Contrastive Energy-based Models: A Unified Framework**. Invited Talk at Peking University. 2021.
- **Reparameterized Sampling for GANs**. Invited Talk at Huawei Noah's Arch Lab. 2021.
- **Reparameterized Sampling for GANs ([Link](#))**. Invited Talk at Beijing Academy of Artificial Intelligence (BAAI). 2021.

SKILLS

Languages: Chinese (Native), English (Fluent).

Programming: Python, MATLAB, C. ML toolkits: PyTorch, Tensorflow, Scikit-learn, JAX.