Yifei Wang

5 Yiheyuan Road, Haidian District, Beijing, China
+86-176-1113-6518 yifei_wang@pku.edu.cn yifeiwang77 pkuwangyifei yifeiwang.me

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*

RESEARCH INTERESTS

I am generally interested in understanding the underlying mechanisms of machine learning models. I mainly work in the following areas to gain better theoretical insights of cutting-edge methods and improve their robustness:

- **Self-Supervised Learning**: learning dynamics; downstream generalization; generative modeling
- **Robust Learning**: robust pretraining; domain generalization; domain adaptation
- **Graph Learning**: graph message passing; graph spectral methods; graph equilibrium models

SELECTED HONORS AND AWARDS

- **Best Machine Learning Paper Award**, ECML-PKDD, 2021 (**1/685**)
- **Silver Best Paper Award**, ICML AML workshop, 2021
- **Outstanding Graduates of Beijing**, 2023
- **Outstanding Graduates 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

PUBLICATIONS

*: equal contribution SSL Self-Supervised Learning ROBUST Robust Learning GRAPH Graph Learning

[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* ROBUST **2023**
- Zeming Wei, **Yifei Wang**, Yiwen 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 ROBUST **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* ROBUST **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* ROBUST **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* ROBUST **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* ROBUST **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] *G^2CN: 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 ROBUST **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 **09 2018 – 03 2019**
Research Intern *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

- **Towards Theoretical Foundations of Self-Supervised Learning**. KAIST. 2022.
- **Towards Truly Unlearnable Examples for Data Privacy**. Chinese Academy of Science. 2022.
- **Contrastive Energy-based Models: A Unified Framework**. Peking University. 2021.
- **Reparameterized Sampling for GANs**. Huawei Noah's Arch Lab. 2021.
- **Reparameterized Sampling for GANs** (Link). Beijing Academy of Artificial Intelligence (BAAI). 2021.

SKILLS

Languages: Chinese (Native), English (Fluent).
Programming: Python, MATLAB, C. ML tooklits: PyTorch, Tensorflow, Scikit-learn, JAX.