Yifei Wang

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EDUCATION

Peking University, School of Mathematical Sciences **09 2017 – 06 2023 (expected)**
Ph.D. Candidate in Applied Mathematics *Beijing, China*
Member of ZERO Lab. *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*

EXPERIENCE

Huawei Noah's Arch Lab **09 2021 – 03 2022**
Research Intern *Beijing, China*
- Research on energy-based approaches to self-supervised learning.

Huawei Noah's Arch Lab **09 2019 – 03 2020**
Research Intern *Beijing, China*
- Research on disentangling of robust and non-robust features through end-to-end learning.

Baidu's Phoenix Nest **09 2018 – 03 2019**
Research Intern *Beijing, China*
- Research on end-to-end AD selection with Reinforcement Learning and Transformer.

SELECTED AWARDS

- **Best Machine Learning Paper Award**, ECML-PKDD, 2021 (**1/685**)
- **Silver Best Paper Award**, ICML AML workshop, 2021
- **National Scholarship**, 2021, 2022 (Highest scholarship given by Chinese government, top 1%)
- **Principal Scholarship**, 2022 (Highest scholarship given by PKU, one per department, top 1%)
- **Baidu Scholarship Nomination Award** (20 worldwide), Baidu Inc, 2022
- **Meritorious Winner** (**First Prize**), Mathematical Contest in Modeling, 2016
- **Yizheng Scholarship**, Peking University, 2016

RESEARCH INTERESTS

I am generally interested in uncovering the underlying mechanisms of foundational learning paradigms (to name a few, contrastive learning, masked autoencoding, adversarial training). Now I research on the following major subjects of modern machine learning to establish their theoretical foundations and improve real-world effectiveness:

- **Unsupervised Learning**: feature learning, generalization, transferability and robustness; generative models
- **Robust Learning**: out-of-distribution robustness; adversarial robustness; data privacy and copyright
- **Graph Learning**: understanding and designing feature propagation inside GNNs and Transformers

PUBLICATIONS

*: equal contribution UNSUP Unsupervised Learning ROBUST Robust Learning GRAPH Graph Learning

[ICLR'23] *A Message Passing Perspective on Learning Dynamics of Contrastive Learning*
- **Yifei Wang***, Qi Zhang*, Tianqi Du, Jiansheng Yang, Zhouchen Lin, Yisen Wang UNSUP GRAPH

[ICLR'23] *Towards a Unified Theoretical Understanding of Non-contrastive Learning via Rank Differential Mechanism*
- Zhijian Zhuo*, **Yifei Wang***, Yisen Wang UNSUP

[ICLR'23] *Rethinking the Effect of Data Augmentation in Adversarial Contrastive Learning*
- Rundong Luo*, **Yifei Wang***, Yisen Wang UNSUP ROBUST

[ICLR'23] *ContraNorm: A Contrastive Learning Perspective on Oversmoothing and Beyond*
- Xiaojun Guo*, **Yifei Wang***, Tianqi Du, Yisen Wang UNSUP GRAPH

[ICLR'23] *Unbiased Stochastic Proximal Solver for Graph Neural Networks with Equilibrium States*
- Mingjie Li, **Yifei Wang**, Yisen Wang, Zhouchen Lin GRAPH

[AAAI'23 Oral] *On the Connection between Invariant Learning and Adversarial Training for Out-of-Distribution Generalization*
- Shiji Xin, **Yifei Wang**, Jingtong Su, Yisen Wang ROBUST

[NeurIPS'22 Spotlight] *How Mask Matters: Towards Theoretical Understandings of Masked Autoencoders*
- Qi Zhang*, **Yifei Wang***, Yisen Wang UNSUP

[NeurIPS'22 Spotlight] *Improving Out-of-distribution Robustness by Adversarial Training with Structured Priors*
- Qixun Wang*, **Yifei Wang***, Hong Zhu, Yisen Wang ROBUST

[NeurIPS'22 Spotlight] *When Adversarial Training Meets Vision Transformers: Recipes from Training to Architecture*
- Yichuan Mo, Dongxian Wu, **Yifei Wang**, Yiwen Guo, Yisen Wang ROBUST

[NeurIPS'22 SSL Workshop] *Variational Energy-Based Models: A Probabilistic Framework for Contrastive Self-Supervised Learning*
- Tianqi Du*, **Yifei Wang***, Yisen Wang UNSUP

[NeurIPS'22 SSL Workshop Oral] *AggNCE: Asymptotically Identifiable Contrastive Learning*
- Jingyi Cui*, Weiran Huang*, **Yifei Wang**, Yisen Wang UNSUP

[BigData'22 Long Talk] *Efficient and Scalable Implicit Graph Neural Networks with Virtual Equilibrium*
- Qi Chen, **Yifei Wang**, Yisen Wang, Jianlong Chang, Qi Tian, Jiansheng Yang, Zhouchen Lin GRAPH

[ICML'22] *Optimization-induced Graph Implicit Nonlinear Diffusion*
- Qi Chen, **Yifei Wang**, Yisen Wang, Zhouchen Lin GRAPH

[ICML'22] *G^2CN: Graph Gaussian Convolution Networks with Concentrated Graph Filters*
- Mingjie Li, Xiaojun Guo, **Yifei Wang**, Yisen Wang, Zhouchen Lin GRAPH

[ICLR'22] *Chaos is a Ladder: A New Theoretical Understanding of Contrastive Learning via Augmentation Overlap*
- **Yifei Wang***, Qi Zhang*, Yisen Wang, Jiansheng Yang, Zhouchen Lin UNSUP

[ICLR'22] *A Unified Contrastive Energy-based Model for Understanding the Generative Ability of Adversarial Training*
- **Yifei Wang**, Yisen Wang, Jiansheng Yang, Zhouchen Lin UNSUP ROBUST

[NeurIPS'21] *Residual Relaxation for Multi-view Representation Learning*
- **Yifei Wang**, Zhengyang Geng, Feng Jiang, Chuming Li, Yisen Wang, Jiansheng Yang, Zhouchen Lin UNSUP

[NeurIPS'21] *Dissecting the Diffusion Process in Linear Graph Convolutional Networks*
- **Yifei Wang**, Yisen Wang, Jiansheng Yang, Zhouchen Lin GRAPH

[ECML-PKDD'21 Best ML Paper] *Reparameterized Sampling for Generative Adversarial Networks*
- **Yifei Wang**, Yisen Wang, Jiansheng Yang, Zhouchen Lin UNSUP

[ICML'21 AML Workshop Silver Best Paper] *Demystifying Adversarial Training via A Unified Probabilistic Framework*
- **Yifei Wang**, Yisen Wang, Jiansheng Yang, Zhouchen Lin UNSUP ROBUST

[COLING'20] *Train Once, and Decode as You Like*
- Chao Tian, **Yifei Wang**, Hao Cheng, Yijiang Lian, Zhihua Zhang UNSUP

ROLES AND RESPONSIBILITIES

- Conference Reviewer: ICML (2022), NeurIPS (2022), ICLR (2022), ACL (2021, 2022), CVPR (2023), ECML-PKDD (2022)
- Organizer of a regular reading group on self-supervised learning (around 15 members) @ PKU, 2021-now
- 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

- 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. Beijing Academy of Artificial Intelligence (BAAI). 2021.

SKILLS

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