Zhiyang Wang

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Philadelphia, PA, 19104, USA

Research Interest

Machine Learning, Graph Neural Networks, Graph Signal Processing, Geometric Deep Learning, Manifold Neural Networks, Wireless Communication Networks.

Education

- **University of Pennsylvania** *2019 - Present*
  Ph.D. in Electrical and Systems Engineering Philadelphia, USA
  ◦ Advisor: Prof. Alejandro Ribeiro
- **University of Science and Technology of China** *2016 - 2019*
  Master in Electrical Engineering Hefei, China
  ◦ Advisor: Prof. Cong Shen
- **University of Science and Technology of China** *2012 - 2016*
  Bachelor in Electrical Engineering Hefei, China
  ◦ Advisor: Prof. Cong Shen

Publications

Preprints:

[P.1] **Z. Wang**†, J. Cerviño†, and A. Ribeiro, "A Manifold Perspective on the Statistical Generalization of Graph Neural Networks," *arXiv*, arXiv:2406.05225, 2024.

Journals:

[J.9] **Z. Wang**, J. Cerviño, and A. Ribeiro, "Generalization of Geometric Graph Neural Networks," submitted to *IEEE Transactions on Signal Processing*.

[J.8] **Z. Wang**, L. Ruiz, and A. Ribeiro, "Geometric Graph Filters and Neural Networks: Limit Properties and Discriminability Trade-offs," *IEEE Transactions on Signal Processing*, vol. 72, pp. 2244-2259, 2024.

[J.7] C. Battiloro, **Z. Wang**, H. Riess, P. Di Lorenzo, and A. Ribeiro, "Tangent Bundle Convolutional Learning: from Manifolds to Cellular Sheaves and Back," *IEEE Transactions on Signal Processing*, vol. 72, pp. 1892-1909, 2024.

[J.6] **Z. Wang**, L. Ruiz, and A. Ribeiro, "Stability to Deformations of Manifold Filters and Manifold Neural Networks," *IEEE Transactions on Signal Processing*, vol. 72, pp. 2130-2146, 2024.

[J.5] A. Parada-Mayorga, **Z. Wang**, F. Gama, and A. Ribeiro, "Stability of Aggregation Graph Neural Networks," *IEEE Transactions on Signal and Information Processing over Networks*, vol. 9, pp. 850-864, 2023.

[J.4] A. Parada-Mayorga, **Z. Wang**, and A. Ribeiro, "Graphon Pooling for Reducing Dimensionality of Signals and Convolutional Operators on Graphs," *IEEE Transactions on Signal Processing*, vol. 71, pp. 3577-3591, 2023.

[J.3] **Z. Wang**, M. Eisen, and A. Ribeiro, "Learning Decentralized Wireless Resource Allocations with Graph Neural Networks," *IEEE Transactions on Signal Processing*, vol. 70, pp. 1850-1863, 2022.

[J.2] **Z. Wang**, R. Zhou, and C. Shen, "Regional Multi-Armed Bandits with Partial Informativeness," *IEEE Transactions on Signal Processing*, vol. 66, pp. 5705-5717, 2018.

[J.1] **Z. Wang** and C. Shen, "Small Cell Transmit Power Assignment Based on Correlated Bandit Learning," *IEEE Journal on Selected Areas in Communications*, vol. 35, pp. 1030-1045, 2017.

Machine Learning Conferences:

[MC.3] **Z. Wang**, L. Ruiz, and A. Ribeiro,"Convolutional neural networks on manifolds: From graphs and back," *Conference on Neural Information Processing Systems* (NeurIPS), Workshop: New Frontiers in Graph Learning, 2022.

[MC.2] C. Shen, **Z. Wang**, S. S Villar, and M. van der Schaar, "Learning for Dose Allocation in Adaptive Clinical Trials with Safety Constraints," *International Conference on Machine Learning* (ICML), 2020.

[MC.1] **Z. Wang**, R. Zhou, and C. Shen, "Regional Multi-Armed Bandits," *International Conference on Artificial Intelligence and Statistics* (AISTATS), 2018.

Signal Processing and Communications Conferences:

[C.13] **Z. Wang**, L. Ruiz, and A. Ribeiro, "Convergence of Graph Neural Networks on Relatively Sparse Graphs," *Asilomar Conference on Signals, Systems, and Computers*, 2023.

[C.12] C. Battiloro, **Z. Wang**, H. Riess, P. Di Lorenzo, and A. Ribeiro, "Tangent Bundle Filters and Neural Networks: from Manifolds to Cellular Sheaves and Back," *International Conference on Acoustics, Speech, and Signal Processing* (ICASSP), 2023.

[C.11] **Z. Wang**, L. Ruiz, and A. Ribeiro, "Convolutional Filtering on Sampled Manifolds," *International Conference on Acoustics, Speech, and Signal Processing* (ICASSP), 2023.

[C.10] **Z. Wang**, L. Ruiz, and A. Ribeiro, "Convolutional Neural Networks on Manifolds: From Graphs and Back," *Asilomar Conference on Signals, Systems, and Computers*, 2022.

[C.9] **Z. Wang**, L. Ruiz, and A. Ribeiro, "Stability of Neural Networks on Manifolds to Relative Perturbations," *International Conference on Acoustics, Speech, and Signal Processing* (ICASSP), 2022.

[C.8] **Z. Wang**, L. Ruiz, M. Eisen, and A. Ribeiro, "Stable and Transferable Wireless Resource Allocation Policies via Manifold Neural Networks," *International Conference on Acoustics, Speech, and Signal Processing* (ICASSP), 2022.

[C.7] **Z. Wang**, L. Ruiz, and A. Ribeiro, "Stability of Neural Networks on Riemannian Manifolds," *European Signal Processing Conference* (EUSIPCO), 2021. **Best Student Paper Award.**

[C.6] **Z. Wang**, M. Eisen, and A. Ribeiro, "Unsupervised Learning for Asynchronous Resource Allocation in Ad-hoc Wireless Networks," *International Conference on Acoustics, Speech, and Signal Processing* (ICASSP), 2021.

[C.5] L. Ruiz, **Z. Wang**, and A. Ribeiro, "Graph and Graphon Neural Network Stability," *International Conference on Acoustics, Speech, and Signal Processing* (ICASSP), 2021.

[C.4] **Z. Wang**, M. Eisen, and A. Ribeiro, "Decentralized Wireless Resource Allocation with Graph Neural Networks," *Asilomar Conference on Signals, Systems, and Computers*, 2020.

[C.3] **Z. Wang**, Z. Ying, and C. Shen, "Opportunistic Spectrum Access via Good Arm Identification," *IEEE Global Conference on Signal and Information Processing* (GlobalSIP), 2018.

[C.2] **Z. Wang** and C. Shen,"Small Cell Power Assignment with Unimodal Continuum-armed Bandits," *IEEE International Conference on Communications* (ICC), Workshop: 5G-UDN, 2018.

[C.1] **Z. Wang**, C. Shen, X. Luo, and M. van der Schaar, "Learn to Adapt: Self-Optimizing Small Cell Transmit Power with Correlated Bandit Learning," *IEEE International Conference on Communications* (ICC), 2017.

Work Experience

- **Mitsubishi Electric Research Laboratories** *June 2023 - August 2023*
  Research Intern Onsite
  ◦ Host: Dr. Jianlin Guo
- **Pennsylvania State University** *July 2018 - December 2018*
  Visiting Scholar Onsite
  ◦ Host: Prof. Jing Yang

Honors and Awards

- **EECS Rising Stars** *November 2023*
  2023 Rising Stars in EECS Workshop at Georgia Tech
- **Rising Star Program in Signal Processing** *June 2023*
  Awarded by International Conference on Acoustics, Speech, and Signal Processing (ICASSP)
- **EUSIPCO Best Student Paper Award** *September 2021*
  Awarded by European Association For Signal Processing to 3 student finalists at the paper competition Q&A
- **Bruce Ford Memorial Fellowship** *August 2019*
  Awarded by the University of Pennsylvania in recognition of impressive achievements
- **The Dean's Fellowship** *August 2019*
  Award by the University of Pennsylvania ESE Department in recognition of exceptional performance
- **National Award for Graduates** *September 2017*
  Granted by Ministry of Education of China to graduate students with excellent academic performance
- **IEEE ICC Student Travel Grant** *2017*
  Awarded by IEEE International Conference on Communications (ICC)
- **First Prize in Graduate Academic Scholarship** *2016 - 2019*
  Awarded by the University of Science and Technology of China
- **Excellent Award in the Undergraduate Research Program** *October 2015*
  Awarded by the University of Science and Technology of China

- **First Prize in Contemporary Undergraduate Mathematical Contest in Modeling, Anhui Division** *September 2015*
  Awarded by China Society for Industrial and Applied Mathematics
- **Outstanding Student Scholarship** *2013 - 2015*
  Awarded by the University of Science and Technology of China
- **Outstanding Volunteer of the China Young Volunteers Association** *2013*
  Awarded by China Young Volunteers Association

Presentations

Talks:

- **Manifold Filters and Neural Networks: Geometric Graph Signal Processing in the Limit** *April 2024*
  University of Pennsylvania ESE PhD Colloquium
- **Convergence of Graph Neural Networks on Relatively Sparse Graphs** *October 2023*
  Asilomar Conference on Signals, Systems, and Computers
- **THEORINET Critique Retreat** *September 2022*
  Flatiron Institute
- **Learning Decentralized Wireless Resource Allocations with Graph Neural Networks** *May 2022*
  University of Pennsylvania ESE PhD Colloquium
- **Decentralized Wireless Resource Allocation with Graph Neural Networks** *May 2020*
  Intel WAS ISTC Review Meeting
- **Opportunistic Spectrum Access via Good Arm Identification** *November 2018*
  IEEE Global Conference on Signal and Information Processing
- **Learn to Adapt: Self-Optimizing Small Cell Transmit Power with Correlated Bandit Learning** *May 2017*
  IEEE International Conference on Communications

Posters:

- **Manifold Filters and Neural Networks: Geometric Graph Signal Processing in the Limit** *June 2023*
  Rising Stars in Signal Processing Program at ICASSP
- **Convolutional Filtering on Sampled Manifolds** *June 2023*
  International Conference on Acoustics, Speech, and Signal Processing (ICASSP)
- **Convolutional neural networks on manifolds: From graphs and back** *December 2022*
  NeurIPS Workshop: New Frontiers in Graph Learning
- **Convolutional Neural Networks on Manifolds: From Graphs and Back** *October 2022*
  Asilomar Conference on Signals, Systems, and Computers

Teaching Experience

- **Teaching Assistant for ESE 514 Graph Neural Networks** *Fall 2021*
  University of Pennsylvania
- **Teaching Assistant for ESE 224 Signal and Information Processing** *Spring 2021*
  University of Pennsylvania
- **Teaching Assistant for ESE 680 Graph Neural Networks** *Fall 2020*
  University of Pennsylvania
- **Teaching Assistant for MIMO Wireless Communications** *Fall 2017*
  University of Science and Technology of China
- **Teaching Assistant for C Programming** *Spring 2015*
  University of Science and Technology of China
- **Mentor** *May 2024 - Present*
  Graduate: Romina Garcia
- **Mentor** *June 2020 - August 2020*
  Undergraduate: Martin Alijaj

Professional Service

Reviewer:

- **IEEE Journal on Selected Areas in Communications** *2024*
- **IEEE Internet of Things Journal** *2024*
- **IEEE Access** *2024*
- **SIAM Journal on Mathematics of Data Science** *2024*
- **IEEE Transactions on Signal Processing** *2023 - 2024*
- **IEEE Transactions on Vehicular Technology** *2021, 2024*
- **IEEE Transactions on Wireless Communications** *2023*

- **IEEE Sensors Journal** *2023*
- **International Journal of Electrical and Computer Engineering Systems** *2023*
- **IEEE International Symposium on Information Theory** *2024*
- **IEEE International Workshop on Machine Learning for Signal Processing (MLSP)** *2023 - 2024*
- **Asilomar Conference on Signals, Systems, and Computers** *2022 - 2024*
- **IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)** *2021 - 2024*

Professional Skills

- **Programming Languages:** Python, C++, C, MATLAB
- **Machine Learning Libraries:** scikit-learn, PyTorch, TensorFlow
- **Natural Languages:** English, Mandarin

Professional Memberships

- **INFORMS Membership** *2024 - Present*
- **IEEE Signal Processing Society Student Membership** *2019 - Present*
- **IEEE Student Membership** *2017 - Present*

References

Available upon request.