Shijun ZHANG

Phillip Griffiths Assistant Research Professor

Email: shijun.math@outlook.com
or shijun.zhang@duke.edu
Articles on arXiv: URL
Google Scholar: URL

Homepage: https://shijunzhang.top
Address: Department of Mathematics
Duke University
United States

Work Experience

Phillip Griffiths Assistant Research Professor,
Duke University, United States — Aug 2022 ∼ Present
Mentors: Jianfeng Lu and Hongkai Zhao

Research Fellow, National University of Singapore, Singapore — Jan 2021 ∼ Jul 2022
Mentor: Zuowei Shen

Education

Ph.D. in Mathematics, National University of Singapore, Singapore — Aug 2016 ∼ Jan 2021
Thesis: *Deep neural network approximation via function compositions* [URL]
Supervisors: Zuowei Shen and Haizhao Yang

B.S. in Mathematics, Wuhan University, China — Sep 2012 ∼ Jul 2016

Honors and Awards

Scholar Award, NeurIPS 2022 Financial Assistance program, URL.

The EASIAM (East Asia section of SIAM) Student Paper Prize, 2020 ∼ 2021, first prize, URL.

Publications

[number] (Position & Institution, Date of first submission) Author(s). *Paper title.* Journal or conference reference. [Links]

* Corresponding author

RF = Research Fellow NUS = National University of Singapore ARP = Assistant Research Professor Duke = Duke University

Preprints

[11] (ARP at Duke) Shijun Zhang, Hongkai Zhao, Yimin Zhong, Haomin Zhou. *Why shallow networks struggle with approximating and learning high frequency: A numerical study.* Submitted. [arXiv]

Published (Accepted)

[10] (ARP at Duke) Shijun Zhang*, Jianfeng Lu, Hongkai Zhao. *On enhancing expressive power via compositions of single fixed-size ReLU network.* Accepted by ICML 2023. [arXiv]

[9] (RF at NUS) Zuowei Shen, Haizhao Yang, Shijun Zhang*. *Neural network architecture beyond width and depth.* Advances in Neural Information Processing Systems (NeurIPS 2022), 35:5669–5681, 2022. [arXiv, Poster, Conference]

[8] (RF at NUS) Zuowei Shen, Haizhao Yang, Shijun Zhang*. *Deep network approximation: achieving arbitrary accuracy with fixed number of neurons.* Journal of Machine Learning Research, Volume 23, Issue 276, September 2022, Pages 1–60. [arXiv, Journal]

[7] (RF at NUS) Zuowei Shen, Haizhao Yang, Shijun Zhang*. *Deep network approximation in terms of intrinsic parameters.* Proceedings of the 39th International Conference on Machine Learning (ICML 2022), PMLR 162:19909–19934, 2022. [arXiv, Spotlight (by Shijun), Conference]

[6] (RF at NUS) Zuowei Shen, Haizhao Yang, Shijun Zhang*. *Optimal approximation rate of ReLU networks in terms of width and depth.* Journal de Mathématiques Pures et Appliquées, Volume 157, January 2022, Pages 101–135. [arXiv, Journal]

[5] (PhD at NUS) Jianfeng Lu, Zuowei Shen, Haizhao Yang, Shijun Zhang. *Deep network approximation for smooth functions.* SIAM Journal on Mathematical Analysis, Volume 53, Issue 5, September 2021, Pages 5465–5506. [arXiv, Journal]

[4] (PhD at NUS) Zuowei Shen, Haizhao Yang, Shijun Zhang. *Neural network approximation: Three hidden layers are enough.* Neural Networks, Volume 141, September 2021, Pages 160–173. [arXiv, Journal]

[3] (PhD at NUS) Zuowei Shen, Haizhao Yang, Shijun Zhang. *Deep network with approximation error being reciprocal of width to power of square root of depth.* Neural Computation, Volume 33, Issue 4, April 2021, Pages 1005–1036. [arXiv, Journal]

[2] (PhD at NUS) Zuowei Shen, Haizhao Yang, Shijun Zhang. *Deep network approximation characterized by number of nuerons.* Communications in Computational Physics, Volume 28, Issue 5, November 2020, Pages 1768–1811. [arXiv, Journal]

[1] (PhD at NUS) Zuowei Shen, Haizhao Yang, Shijun Zhang. *Nonlinear approximation via compositions.* Neural Networks, Volume 119, November 2019, Pages 74–84. [arXiv, Journal]