

# Shijun ZHANG

Phillip Griffiths Assistant Research Professor

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## 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

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## 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

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## 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.

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## Publications

\* Corresponding author    NUS = National University of Singapore    RF = Research Fellow

[9] (RF at NUS) Zuowei Shen, Haizhao Yang, Shijun Zhang\*. *Neural Network Architecture Beyond Width and Depth*. Accepted by NeurIPS 2022. [ arXiv ]

- [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 neurons*. 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 ]