THE UNIVERSITY OF HONG KONG

Institute of Mathematical Research
Department of Mathematics

Numerical Analysis Seminar

Spectral Barron space and deep neural network approximation

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NUS

Abstract

This work explores the neural network approximation capabilities for functions within the spectral Barron space. We establish a sharp, dimension-independent embedding between spectral Barron and Besov spaces. Given the spectral Barron space as the target function space, we derive approximation guarantees for shallow neural networks whose rates and prefactors are dimension-free. This rate also applies to uniform approximation, differing by at most a logarithmic factor. Our results significantly reduce the smoothness requirement compared to existing theory to attain the same rate. Furthermore, we show that increasing the network's depth can notably improve the approximation order for functions with small smoothness. We also confirm the sharpness of our findings, with the lower bound closely aligning with the upper, with a discrepancy of at most one logarithmic factor. This is a joint work with Prof. Pingbing Ming and Hao Yu.

Date:	January 26, 2026 (Monday)
Time:	11:00 am – 12:00 noon
Venue:	Room 210, Run Run Shaw Building, HKU

All are welcome