Einladung zum Oberseminar Wissenschaftliches Rechnen

Julius-Maximilians-Universität Würzburg
Lehrstuhl für Wissenschaftliches Rechnen IX

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Julius-Maximilians-Universität Würzburg, Lehrstuhl für Mathematik IX

Spectral Barron-type spaces: sharp embeddings, interpolation, duality and neural network approximation

Motivated by applications to neural networks, we define a scale of (isotropic) *spectral Barron-type spaces* $\mathcal{B}^s_p$, $1 \leq p \leq \infty$, of tempered distributions with regularity $s \in \mathbb{R}$ and characterize their embeddings. It is shown that this scale behaves well under real and complex interpolation, duality, taking derivatives and lifting as well as reduction. Moreover, we investigate the action of linear coordinate transforms (such as rotations and dilations) as well as of translation and modulation operators on $\mathcal{B}^s_p$. As byproducts, we improve and extend known results for so-called *spectral Barron spaces* $B^s = \mathcal{B}^s_\infty$ and reveal connections to classical function spaces like C^k, bmo, Lipschitz, Hölder, Lebesgue, Sobolev, Bessel potential, Besov and Triebel-Lizorkin spaces. In particular, we show that $\mathcal{B}^s_p$ is not covered by these scales unless $p = 2$, in which case there holds $\mathcal{B}^s_2 = H^s$, $s \in \mathbb{R}$. Finally, quantitative bounds for the approximation of $f \in \mathcal{B}^s_p$ by shallow neural networks using Heaviside or ReLU^m activation functions with $m \in \mathbb{N}$ are derived.

Ort: Raum 41.00.006 (Humboldt-Bau, Emil-Fischer-Str. 41) **Zeit:** Mo. 06.07.2026, 10:00 Uhr

Zu diesem Vortrag laden wir Sie herzlich ein.
You are cordially invited to this lecture.

gez. Prof. Dr. Alfio Borzì
gez. Prof. Dr. Frank Werner