复旦大学数学科学学院
数学综合报告会

报告题目： Kernel-based Regularity Estimation--Nested Data

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地点：光华楼东主楼 2001

报告摘要：

We study the same problem of estimating the local regularity of an unknown function $f : \Omega \subset \mathbb{R}^d \rightarrow \mathbb{R}$ from scattered samples $(X, f(X))$, but from a different theoretical standpoint. Building on Sobolev-space reproducing kernels, we establish a rigorous correspondence between the convergence rate of kernel approximants and the underlying Sobolev smoothness of the target function. The analysis develops a distinct framework based on newly proven Bernstein-type inverse inequalities for kernel trial spaces, which lead to an improved inverse theorem for kernel interpolation on bounded domains. In contrast to earlier inverse formulations requiring convergence over all quasi-uniform node sets, the improved theory proves that smoothness can be recovered from one carefully constructed nested sequence of point sets. This theoretical advance underpins quantitative regularity estimation in kernel-based approximation and numerical experiments in various settings highlight the effectiveness of the proposed algorithm.

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