# Approximation of piecewise Hölder classes from inexact information

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We study algorithms for $L^p$-approximation ($1 \leq p < \infty$) of functions $f : [a, b] \to \mathbb{R}$ that are piecewise $r$-times continuously differentiable and $f^{(r)}$ are piecewise Hölder continuous with exponent $\rho \in (0, 1]$. The singular points of $f$ are unknown. Available information is blurred and given as $y_i = f(x_i)+e_i$, $1 \leq i \leq n$, where $|e_i| \leq \delta$. We show that a necessary and sufficient condition for the error of approximation to be at most $\varepsilon$ is that $n \asymp \varepsilon^{-1/(r+\rho)}$ and $\delta \asymp \varepsilon$. The optimal algorithms use adaptive information. This generalizes previous results where information was exact and we had $\rho = 1$.

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