

SMOOTHING FUNCTIONS FOR SPARSE OPTIMIZATION: A UNIFIED FRAMEWORK

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This talk presents a unified framework for constructing smoothing functions tailored to a broad class of widely used regularizers, including the plus function, the pinball function, the ℓ_0 -norm, the ℓ_p -norm for $0 < p \leq 1$, the MCP, and the SCAD. By transforming nonsmooth regularizers into smooth approximations, the proposed framework facilitates the application of efficient optimization algorithms to sparse optimization problems. The framework is systematically derived from continuous approximations of the step function, offering a principled approach to generating smoothing functions across various regularizers. These approximations are, in turn, constructed using polynomial functions and the Dirac delta function.

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