

Compactly Epi-Lipschitzian Convex Sets and Functions in Normed Spaces

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Abstract: We provide several characterizations of compact epi-Lipschitzness for closed convex sets in normed vector spaces. In particular, we show that a closed convex set is compactly epi-Lipschitzian if and only if it has nonempty relative interior, finite codimension, and spans a closed subspace. Next, we establish that all boundary points of compactly epi-Lipschitzian sets are proper support points. We provide the corresponding results for functions by using inf-convolutions and the Legendre-Fenchel transform. We also give an application to constrained optimization with compactly epi-Lipschitzian data via a generalized Slater condition involving relative interiors.

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