Zero Duality Gap Conditions via Abstract Convexity

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Using tools provided by the theory of abstract convexity, we extend conditions for zero duality gap to the context of nonconvex and nonsmooth optimization. Substituting the classical setting, an abstract convex function is the upper envelope of a subset of a family of abstract affine functions (being conventional vertical translations of the abstract linear functions). We establish new characterizations of the zero duality gap under no assumptions on the topology on the space of abstract linear functions. Endowing the latter space with the topology of pointwise convergence, we extend several fundamental facts of the conventional convex analysis. In particular, we prove that the zero duality gap property can be stated in terms of an inclusion involving -subdifferentials, which are shown to possess a sum rule. These conditions are new even in conventional convex cases. The Banach-Alaoglu-Bourbaki theorem is extended to the space of abstract linear functions. The latter result extends a fact recently established by Borwein, Burachik and Yao in the conventional convex case.

This talk is based on joint work with Regina Burachik, Alex Kruger and David Yost.

Presentation Link