

# Generalized differentiation and regularization of probability functions

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ABSTRACT. Optimization problems with uncertainty in the constraints occur in many applications. Particularly, probability functions presents a natural way to deal with uncertainty in the constraints. In this talk, we study two formulations of probability functions and their applications. First we study the generalized differentiability of a probability function generated by set-valued mappings, by means of which we are able obtain a differentiability result for joint probability functions with quasiconvex initial data. On the other hand, motivated by the fact that the resulting probability function may be nonsmooth we propose a regularization via Moreau envelope of a probability function formulated as a vectorial inequality, which covers in particular the case of joint probability functions.

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