First-Order information of Probability Functions: Star-Shaped Parameter-Dependent Sets

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Probability functions appear as constraints in many optimization problems since they provide an intuitive way to deal with uncertainty. Probability functions are built up from a random vector belonging to some parameter-dependent subset of the range of that given random vector. In this presentation, we expose first-order information of probability functions in the case that the parameter-dependent set is star-shaped. Under mild conditions, we establish local Lipschitz continuity and differentiability using an approach that also provides us with an implementable gradient formula.

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