SECOND-ORDER SUBDIFFERENTIALS AND OPTIMALITY CONDITIONS FOR UNCONSTRAINED $C^1$-SMOOTH OPTIMIZATION PROBLEMS

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The Fréchet second-order subdifferentials and the limiting second-order subdifferentials for real-valued functions, which was defined by the Fréchet coderivatives and the limiting coderivatives for multifunctions, was studied in [2]. Recently, it has been shown in [1] that the convexity of a real-valued function can be characterized by the Fréchet and limiting second-order subdifferentials. Moreover, Poliquin and Rockafellar [3] have proved that the positive definiteness of the limiting second-order subdifferential mapping $\partial^2\varphi(x,0) : \mathbb{R}^n \to 2^{\mathbb{R}^n}$ characterizes the tilt stability of a stationary point $x$ of a function $\varphi : \mathbb{R}^n \to \mathbb{R}$ (provided $\varphi$ has some required properties).

In this talk, we extend the second-order optimality theorems for unconstrained optimization problems to nondifferentiable cases. We derive necessary second-order optimality conditions for unconstrained $C^1$-smooth optimization problems by using the Fréchet second-order subdifferentials. Moreover, we give two sufficient second-order optimality conditions for unconstrained $C^1$-smooth optimization problems which are expressed with the Fréchet second-order subdifferential and the limiting second-order subdifferential of the objective function.

REFERENCES


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