First Order Nonsmooth Optimization: Catalyst Acceleration and Unifying Nesterov's Acceleration

Hongda Li

University of British Columbia Okanagan

January 23, 2025

Overview

This talks will be based on the content of our draft paper and selected content of the Catalyst Meta Acceleration Framework. Our preprint:

1. X. Wang and H. Li, *A Parameter Free Accelerated Proximal Gradient Method Without Restarting*, preprint, (2025).

Catalyst Meta Acceleration:

1. H. Lin, J. Mairal and Z. Harchaoui, *A universal catalyst for first-order optimization*, in NISP, vol. 28, (2015).
2. _____, *Catalyst acceleration for first-order convex optimization: from theory to practice*, JMLR, 18 (2018), pp. 1–54.

ToC

Notations and preliminaries

Throughout this talk, let $\mathbb{R}^n$ be the ambient space equiped with Euclidean inner product and norm. We consider

$$\min_{x \in \mathbb{R}^n} \{F(x) := f(x) + g(x)\}. \tag{1}$$

Unless specified, assume:

1. $f : \mathbb{R}^n \to \mathbb{R}$ is L-Lipscthiz smooth $\mu \geq 0$ strongly convex,
2. $g : \mathbb{R}^n \to \overline{\mathbb{R}}$ is closed convex proper.

Our works on R-WAPG

Introduction to Catalyst Acceleration

Citation examples

Citation examples [1]

References I

A. Chambolle and C. Dossal, "On the convergence of the iterates of the "Fast iterative shrinkage/thresholding algorithm"," *Journal of Optimization Theory and Applications*, vol. 166, no. 3, pp. 968–982, Sep. 2015. [Online]. Available: https://doi.org/10.1007/s10957-015-0746-4