Accelerated gradient methods for large-scale nonsmooth convex optimization

Dr. Masoud Ahookhosh (University of Vienna)

Over the past few decades, due to dramatic increase in appearance high-dimensional or big data in science and technology, the interest in developing mathematical tools to deal with such problems has been remarkably increased. We here address two gradient methods attaining the optimal complexity for smooth problems with Lipschitz continuous gradients, nonsmooth problems with bounded variation subgradients, and weakly smooth problems with H\"older continuous gradients.

More specifically, the first scheme needs the smoothness parameter and the H\"older constant and requires to solve a single auxiliary problem per iteration.

The second scheme does not need to know about the smoothness parameter and the H\"older constant of gradients in the price of employing a backtracking line search, i.e., it leads to a universal gradient method. The convergence analysis of both schemes is investigated. Numerical results regarding experiments with some applications in sparse optimization and compressed sensing are reported, which confirm the theoretical results.