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Optimization with First-Order Surrogate Functions

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In this paper, we study optimization methods consisting of iteratively minimizing surrogates of an objective function. By proposing several algorithmic variants and simple convergence analyses, we make two main contributions. First, we provide a unified viewpoint for several first-order optimization techniques such as accelerated proximal gradient, block coordinate descent, or Frank-Wolfe algorithms. Second, we introduce a new incremental scheme that experimentally matches or outperforms state-of-the-art solvers for large-scale optimization problems typically arising in machine learning.

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