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Efficiency of coordinate descent methods on huge-scale optimization problems. (English)

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For the unconstrained minimization of a differentiable convex function $f(x_1,\dots,x_n)$ ($x_i\in\mathbb{R}^{n_i}$, $i=1,\dots,n$) with a globally Lipschitz gradient, the random coordinate descent method consists in randomly choosing, at iteration k, some $i_k\in\{1,\dots,n\}$ and then updating the current iterate by making a step in the direction of the negative of the partial gradient with respect to x_{i_k}, the step size being equal to the reciprocal of the Lipschitz constant of this partial gradient. The expected objective function value is shown to converge to the infimum of f; for strongly convex functions, the rate of convergence is linear and an accelerated version is presented. A modification of the method for constrained problems is also introduced. Implementation issues are discussed, and some preliminary numerical experiments are reported.

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