On the Complexity of a Simple Primal-Dual Coordinate Method

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We focus on an algorithm called "primal-dual algorithm with random extrapolation and coordinate descent (PURE-CD)", which has been shown to obtain good practical performance for solving convex-concave min-max problems with bilinear coupling. Such problems arise in many machine learning contexts, including linear empirical risk minimization, matrix games, and image processing. We prove complexity bounds for PURE-CD that either match or improve the best-known complexities for dense and sparse (strongly)-convex-(strongly)-concave problems with bilinear coupling in the literature.

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