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Arkadi Nemirovski* (nemirovs@isye.gatech.edu), 755 Ferst Drive, NW, Atlanta, GA 30332-0205. *Convex optimization on large-scale domains given by Linear Minimization Oracles*. Preliminary report.

We present algorithms for convex-concave saddle point and nonsmooth convex minimization problems on large-scale domains given by “computationally cheap” Linear Minimization Oracles capable to minimize linear forms over the domain. Domains of our primary interest are large-scale nuclear/total variation norm balls, where the common tools of large-scale convex optimization, proximal algorithms which at every step minimize over problem’s domain perhaps simple, but nonlinear convex functions, become too time consuming, while minimizing a linear form over the domain still is relatively easy. The first component of our approach is “Fenchel-type representations” of monotone operators allowing to associate with the original problem its dual – a monotone variational inequality on some other domain. The latter in many important cases is “proximal-friendly,” so that the dual problem can be solved by a proximal algorithm. The second component of our approach is “accuracy certificates” allowing to recover a good solution to the original problem from the information collected when solving the dual. We illustrate our approach by applying it to large-scale Matrix Completion with uniform and spectral norm fits. The talk is based on joint research with Dr. Anatoli Iouditski, France. (Received January 15, 2014)