APPROACHING NONSMOOTH AND NONCONVEX OPTIMIZATION PROBLEMS THROUGH CONTINUOUS AND DISCRETE PROXIMAL-TYPE ALGORITHMS

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In the first part of the talk we address the minimization of the sum of a proper, convex and lower semicontinuous with a (possibly nonconvex) smooth function from the perspective of an implicit dynamical system of forward-backward type. The latter is formulated by means of the gradient of the smooth function and of the proximal point operator of the nonsmooth one. The trajectory generated by the dynamical system is proved to asymptotically converge to a critical point of the objective, provided a regularization of the latter satisfies the Kurdyka-Łojasiewicz property (which is for instance fulfilled for semi-algebraic functions). Convergence rates for the trajectory in terms of the Łojasiewicz exponent of the regularized objective function are also provided.

In the second part we consider a discretized version of the continuous system which leads to a proximal-gradient type algorithm with inertial/memory effects for minimizing the sum of a nonsmooth function with a smooth one in the nonconvex setting. We illustrate the theoretical results by considering two numerical experiments: the first one concerns the ability of recovering the local optimal solutions of nonconvex optimization problems, while the second one refers to the restoration of a noisy blurred image.

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