The proximal alternating direction method of multipliers in the fully nonconvex setting: convergence analysis and rates

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Abstract

In this talk, we consider a numerical algorithm for minimizing the sum of a nonsmooth function with a smooth function and the composition of another nonsmooth function with a linear operator in the fully nonconvex setting. The iterative scheme is formulated in the spirit of the proximal alternating direction method of multipliers, the proximal terms being introduced through variable metrics. This facilitates the derivation of a proximal splitting algorithm for nonconvex complexly structured optimization problems as a particular instance of the general scheme. Convergence of the iterates to a KKT point of the objective function is proved under mild conditions on the sequence of variable metrics and by assuming that the associated augmented Lagrangian has the Kurdyka-Łojasiewicz property. If the augmented Lagrangian has the Łojasiewicz property, then convergence rates of both augmented Lagrangian and iterates can be derived. Finally, similar results are obtained in the absence of the smooth part, but under assumptions on the functions in the objective that allow to recover a slight modification of the classical ADMM algorithm.

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