Research

Colloquium

Nonconvex Proximal Splitting Methods for Convolutional Sparse Representation

主講人：彭冠舉 教授
國立中興大學應用數學系

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摘　要：

In this paper, the dictionary learning problem for the l0 convolutional sparse representation is formulated within a non-convex, non-smooth proximal splitting framework. Then based on the framework and its ADMM and forward-backward splitting solvers, two methods, called the A-ADMM and the A-FB methods are proposed to solve the dictionary learning problem. Two novel parameter adapting schemes are respectively incorporated into both methods, and after the analysis of their computational complexities and convergence properties, we show that, theoretically and numerically, the parameter adapting schemes not only support their sound convergence properties but also increase their convergence speeds. The results of experiments demonstrate that our methods outperform the comparable methods, which are the alternate optimization method and the efficient method solving the problem with the l1 norm constraint, in the image signal processing applications.