Courant Institute of Mathematical Sciences
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Speaker: Patrick Combettes, Universite Pierre et Marie Curie – Paris 6

Title: Proximal Processing for Big Data

Abstract:

Monotone operator splitting technology constitutes the theoretical and algorithmic foundation of a wide array of numerical methods in data-driven problems. Fueled by new developments in abstract duality for monotone inclusions and product space techniques, significant advances have been made in splitting methods in recent years. In particular, it is now possible to solve highly structured optimization problems with algorithms which guarantee the convergence of the iterates. In problems of huge sizes, the implementation of these algorithms faces significant challenges which often render them inapplicable. We present two approaches to circumvent this issue, which both preserve the splitting and convergence properties of the algorithms. First, we propose a general stochastic block-coordinate fixed point framework, from which we derive flexible block-coordinate versions of common splitting algorithms. Second, we propose an asynchronous block-iterative primal-dual splitting framework for composite monotone inclusions in which only subgroups of operators need to be activated at each iteration.