

This paper discusses coordinate update methods, which are useful for solving large-scale problems that admit a fixed-point formulation, including various coordinate descent methods in optimization, solution of linear systems of equations, and many operator splitting algorithms. In particular, the authors introduce several notions of Coordinate Friendly (CF) operators, discuss composite and combination of CF operators, use them to characterize several classical and recent operator splitting schemes, and also obtain some new coordinate update methods. These methods are illustrated by examples from machine learning, imaging, finance, and distributed computing, among others.

The focus of this paper is on summarizing the components and composition of efficient coordinate-update methods, and largely ignore convergence guarantees. On one hand, this seems to be a timely topic given the recent flurry of research activities on coordinate update methods and their applications, and the materials presented may help the understanding of the common theme of these methods, especially for practitioners. But on the other hand, I feel there is not enough innovative ideas other than summarizing several well-known structure of coordinate update methods, and the technical depth of this paper does not reach the high-quality of a first-class journal on mathematical sciences. From a more application oriented view, there is no sufficient justification (either theoretical or empirical) for the efficiency of the derived algorithms, nor comparison with state of the arts for the particular applications discussed. Thus it is not clear how useful they will become, other than illustrating some general ideas.