

Elementary Algorithms for Well Structured Optimization Problems

Marc Teboulle

School of Mathematical Sciences, Tel-Aviv University, Israel

Many fundamental scientific and engineering problems arising in signal recovery, image processing, machine learning and other fields can be formulated as well structured optimization problems. These problems are typically very large scale, and often nonsmooth and even nonconvex. This leads to challenging difficulties for their solutions, precluding the use of most well established sophisticated methods. Elementary algorithms based on first order data information which require simple computational operations and low costs per iteration, then often remain our best alternative to tackle such problems. This talk surveys some of our recent results on the design and analysis of elementary algorithms for some classes of well-structured optimization models arising in a wide variety of applications, highlighting the ways in which problem structures and data information can be beneficially exploited to devise and analyze simple and efficient algorithms.