



復旦大學
FUDAN UNIVERSITY

Applied Math
Ph.D. Seminar

Optimal Gradient Tracking for Decentralized Optimization

Speaker: Zhuoqing Song (Fudan University)

Time: 2021-11-22, 16:10 to 17:00

Location: Rm 1801, Guanghua East Tower

Advisor: Lei Shi (Fudan University)

Abstract: In this talk, we focus on minimizing the sum of smooth and strongly convex local objective functions stored in a distributed manner across the nodes of an undirected network. We propose an Optimal Gradient Tracking (OGT) method which is the first single-loop gradient-type method optimal in both gradient computation and communication complexities. The development of OGT has two steps. First, we propose a new accelerated gradient tracking method termed “Snapshot” Gradient Tracking (SS-GT). Inspired by the variance reduction methods Katyusha and L-Katyusha, SS-GT combines “snapshot” points and “negative momentums” with the classical gradient tracking and outperforms previous single-loop accelerated gradient tracking methods. SS-GT is of independent interest and can be extended to more general settings such as time-varying graphs and directed graphs. Second, we develop a technique termed Loopless Chebyshev Acceleration (LCA) which can be implemented “looplessly” and achieve similar effects with inner loops of Chebyshev acceleration. The LCA technique can accelerate many other gradient tracking based methods with respect to the graph condition number.