应用数学讲座

Научный Семинар по Прикладной Математике
Research Seminar on Applied Mathematics

应用数学报告（95）

报告人 / Докладчик / Speaker: 严明副教授，香港中文大学（深圳）

题 目 / Название / Title: Optimal gradient tracking for decentralized optimization

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摘要 / Аннотация / Abstract:

In this talk, I will focus on solving the decentralized optimization problem of minimizing the sum of objective functions over a multi-agent network. The agents are embedded in an undirected graph where they can only send/receive information directly to/from their immediate neighbors. Assuming smooth and strongly convex objective functions, we propose an Optimal Gradient Tracking (OGT) method that achieves the optimal gradient computation complexity and the optimal communication complexity simultaneously. OGT is the first single-loop decentralized gradient-type method that is optimal in both gradient computation and communication complexities. Its development involves two building blocks that are also of independent interest. The first one is another new decentralized gradient tracking method termed SSGT, which achieves the optimal gradient computation. SSGT can be potentially extended to more general settings compared to OGT. The second one is a technique termed LCA, which can be implemented ``looplessly'' but achieves a similar effect by adding multiple inner loops of Chebyshev acceleration in the algorithm. This LCA technique can accelerate many other gradient tracking based methods with respect to the graph condition number.

严明副教授简介：

Ming Yan is an associate professor in the School of Data Science at The Chinese University of Hong Kong, Shenzhen. His research interests lie in computational optimization and its applications in image processing, machine learning, and other data-science problems. He received his B.S. and M.S in mathematics from University of Science and Technology of China in 2005 and 2008, respectively, and then Ph.D. in mathematics from University of California, Los Angeles in 2012. After completing his PhD, Ming Yan was a Postdoctoral Fellow at Rice University and University of California, Los Angeles from July 2012 to June 2015. Since 2015-2022, he was a faculty member in the Department of Computational Mathematics, Science and Engineering (CMSE) and the Department of Mathematics at Michigan State University. He received a Facebook faculty Award in 2020.