



A link from centralized optimization to distributed optimization

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Abstract: Optimization problems in data science (e.g., machine learning, statistics and data mining) include an abundance of data, which is difficult to be handled by a single processor alone. This necessitates distributing data among multiple processors and processing it in a decentralized manner based on the available local information. Starting in distributed data processing where information is inherently distributed among many processors, this seminar will address the distributed unconstrained/constrained optimization problems over directed communication topologies which is preferred for large-scale systems. By using the finite-time exact ratio consensus technique, we show that classical centralized methods (e.g., Nesterov accelerated gradient) can be transplanted for distributed optimization directly and conveniently. Different distributed methods are proposed, i.e., primal-based (e.g., gradient descent) and dual-based (e.g., alternating direction method of multipliers (ADMM), Legendre-Fenchel conjugate gradient). Characteristics of these methods are analyzed and comparisons with other state-of-the-art algorithms are also discussed in simulations on large-scale networks.

Biography: Wei Jiang is a postdoctoral researcher in Aalto University, Finland since 2019. His research interests include distributed optimization, distributed control, vehicle platooning, robotics and time-delay systems. He received his Ph.D. degree in Automatic, Computer Engineering, Signal Processing and Images in CRISTAL, UMR CNRS 9189, Ecole Centrale de Lille, Lille, France, in 2018, and M.S. degree in automobile engineering from Beihang University, Beijing, China, in 2015, and B.S. degree in mechanical engineering and automation from Wuhan University of Technology, Wuhan, China, in 2011. He was a visiting scholar in University of Cyprus, Cyprus during Oct 2021 – Nov 2021 and KU Leuven, Belgium during Apr 2022 – May 2022.