A Totally Asynchronous Algorithm for Tracking Solutions to Time-Varying Convex Optimization Problems

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Abstract: In this talk I will present recent work on a decentralized algorithm for a team of agents to track time-varying fixed points that are the solutions to time-varying convex optimization problems. The algorithm is first-order, and it allows for total asynchrony in the communications and computations of all agents, i.e., all such operations can occur with arbitrary timing and arbitrary (finite) delays. Convergence rates will be presented that are in terms of the communications and computations that agents execute, without specifying when they must occur. These rates apply to convergence to the minimum of each individual objective function, as well as agents' long-run behavior as their objective functions change. Then, to improve the usage of limited communication and computation resources, the timing of agents' operations relative to changes in their objective functions will be optimized, which will minimize total fixed point tracking error over time. I will then present simulation results to illustrate these developments in practice and empirically assess their robustness to uncertainties in agents' update laws.

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