Totally Asynchronous Large-Scale Quadratic Programming: Regularization, Convergence Rates, and Parameter Selection

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Abstract: Quadratic programs arise in robotics, communications, smart grids, and many other applications. As these problems grow in size, finding solutions becomes more computationally demanding, and new algorithms are needed to efficiently solve them at massive scales. Targeting large-scale problems, in this talk I will present a multi-agent quadratic programming framework in which each agent updates only a small number of the total decision variables in a problem. Agents communicate their updated values to each other, though no restrictions will be imposed on the timing with which they do so, and only mild restrictions will be imposed on the delays in these transmissions. Agents are allowed to independently choose their stepsizes, subject to mild restrictions. The developments I present will further provide the means for agents to independently regularize the problems they solve, thereby improving convergence properties while preserving agents' independence in selecting parameters. Larger regularizations accelerate convergence but increase error in the solution obtained, and I will present simulation results to illustrate the tradeoff between convergence rates and quality of solutions.

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