

Paper Review: Constrained Consensus Algorithms With Fixed Step Size for Distributed Convex Optimization Over Multiagent Networks

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In this paper, the authors propose distributed optimization algorithms with a proper fixed step size over time-invariant multiagent networks. In the network, each agent is assigned to optimize its local objective subject to the local constraints. Meanwhile, each agent also exchanges its state information with its neighbors under a certain topology of the network. Accompanying with undirected and connected graphs and the assumption of convex objective function, the exact or globally optimal point can be guaranteed to be a fixed point of the mapping induced by a projected gradient descent step, in the bound constraint. At the same time, the projection operator does not violate the primal feasibility. In addition, The consensus can be ensured by the Lyapunov method under the assumption of the bounded Hessian matrix of objective functions. Compared with the distributed algorithms with diminishing step size, the fixed step size have a better converge rate, though it might be too small to lead to numerical ill condition.