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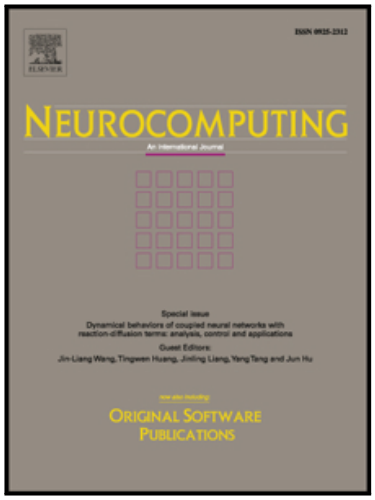

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Distributed Finite-Time Optimization for Second Order Continuous-Time Multiple Agents Systems with Time-varying Cost Function

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Abstract

In this paper, a finite time distributed convex optimization problem is studied for continuous time multiple agents systems. The distributed optimization objective is not only to drive the agents to reach a consensus but also to cooperatively minimize the sum of the objective functions of each agent in finite time. Different from the traditional optimization problems, in this problem, the objective function can be time varying and each agent can only acquire the information of its neighbour's local objective function through the network. In order to solve this problem, firstly, we proposed a centralized finite-time optimization control algorithm. Then, the distributed finite-time optimization controllers for both the first-order and second-order multiple agents systems are designed based on the centralized finite-time optimization algorithm. Theoretical studies indicate that the proposed algorithms can minimize the team objective function in finite time and all agents will reach a consensus in finite time. Finally, a simulation example is presented to show the validity of the theoretical results.

Keywords: Distributed optimization, Finite-time control, Time-varying function

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