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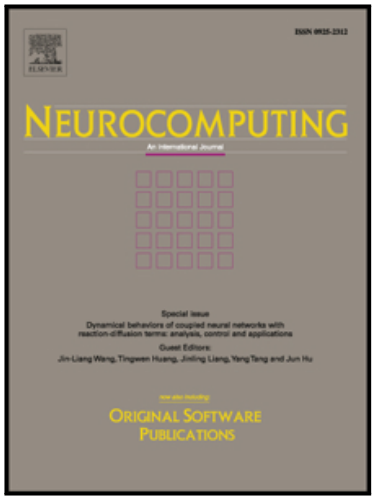

General value iteration based reinforcement learning for solving optimal tracking control problem of continuous-time affine nonlinear systems

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Abstract

In this paper, a novel reinforcement learning (RL) based approach is proposed to solve the optimal tracking control problem (OTCP) for continuous-time (CT) affine nonlinear systems using general value iteration (VI). First, the tracking performance criterion is described in a total-cost manner without a discount term which can ensure the asymptotic stability of the tracking error. Then, some mild assumptions are assumed to relax the restriction of the initial admissible control in most existing references. Based on the proposed assumptions, the general VI method is proposed and three situations are considered to show the convergence with any initial positive performance function. To validate the theoretical results, the proposed general VI method is implemented by two neural networks on a nonlinear spring-mass-damper system and two situations are considered to show the effectiveness.

Keywords: Adaptive dynamic programming, optimal control, reinforcement learning, continuous-time systems

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