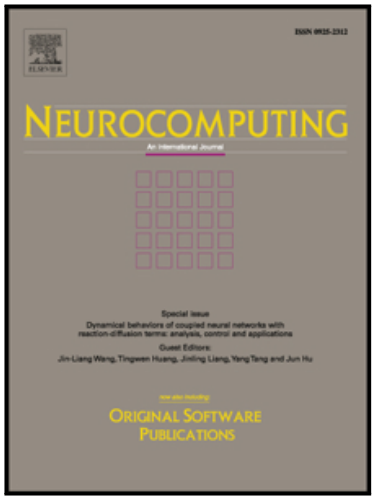
Communicated by Tao Li

Accepted Manuscript



Near-Optimal Output Tracking Controller Design for Nonlinear Systems Using an Event-Driven ADP Approach

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PII: S0925-2312(18)30541-1
DOI: 10.1016/j.neucom.2018.05.010
Reference: NEUCOM 19560

To appear in: *Neurocomputing*

Received date: 23 April 2017
Revised date: 12 March 2018
Accepted date: 2 May 2018

Please cite this article as: Kun Zhang, Huaguang Zhang, He Jiang, Yingchun Wang, Near-Optimal Output Tracking Controller Design for Nonlinear Systems Using an Event-Driven ADP Approach, *Neurocomputing* (2018), doi: 10.1016/j.neucom.2018.05.010

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Abstract

In this paper, a novel output tracking control scheme for a class of continuous-time nonlinear system is proposed by using an event-driven adaptive dynamic programming (ADP) approach. Based on the controlled system and the desired reference trajectory, an augmented system is constructed for the optimal tracking control problem (OTCP), where the control law is composed of the steady-state part and the feedback part. According to the standard solution of the OTCP, the feedback part associated to the cost function is to be solved and the steady-state part of the control can be obtained directly. Thus the event-driven near-optimal control method is proposed to solve feedback control of the OTCP, where a single network ADP approach is developed to approximate the optimal cost function. The output tracking error dynamic get converged to zero and the parameters of critic neural network (NN) get converged to the optimal ones by using the designed weight tuning law and event-triggering condition. The stability of the augmented system under the novel control scheme is guaranteed based on Lyapunov theory and two simulation examples are presented to demonstrate the effectiveness of the proposed method.

Keywords: event-triggered control, neural network (NN), output tracking control, adaptive dynamic programming (ADP), optimal control

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