

1113-49-25

Robert Kozma* (rkozma@memphis.edu), 373 Dunn Hall, The University of Memphis, Memphis, TN 38152, and **Yury Sokolov** and **Paul J. Werbos**. *Stability analysis of approximate dynamic programming (ADP) control using a universal approximator.*

We describe new stability results for an ADP problem using a control algorithm that iteratively improves an internal model of the external world autonomously, based on its continuous interaction with the environment. We extend previous results for Action-Dependent Heuristic Dynamic Programming (ADHDP) control based on general multi-layer neural networks with universal approximation properties based on learning across all layers. We prove that the introduced control approach is uniformly ultimately bounded (UUB) under specific conditions on the learning rates, without explicit constraints on the value of the temporal discount factor. We demonstrate the advantages of our results in controlling linear and nonlinear systems. In particular, we show improved learning and control performance as compared to the state-of-art.

This is a joint work with Luda D. Werbos, IntControl LLC, Arlington, VA, USA.

(Received June 04, 2015)