



Wavelet Neural Network Based Adaptive Tracking Control for a Class of Uncertain Nonlinear Systems Using Reinforcement Learning

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Abstract: In this paper an adaptive critic based wavelet neural network (WNN) based tracking control strategy for a class of uncertain systems in continuous time is proposed. The adaptive critic WNN controller comprises two WNNs: critic WNN and action WNN. The critic WNN is approximating the strategic utility function, whereas the action WNN is minimizing both the strategic utility function and the unknown nonlinear dynamic estimation errors. Adaptation laws are developed for the online tuning of wavelets parameters. The uniformly ultimate boundedness of the closed-loop tracking error is verified even in the presence of WNN approximation errors and bounded unknown disturbances, using the Lyapunov approach and with novel weight updating rules. Finally some simulations are performed to verify the effectiveness and performance of the theoretical development.

Keywords: *wavelet neural networks; optimal control; adaptive control; reinforcement learning; Lyapunov functional.*

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