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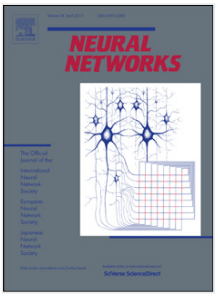

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PII: S0893-6080(13)00130-5
DOI: http://dx.doi.org/10.1016/j.neunet.2013.04.014
Reference: NN 3191

To appear in: *Neural Networks*

Received date: 19 February 2013
Revised date: 25 April 2013
Accepted date: 28 April 2013

Please cite this article as: Huang, H., Huang, T., & Chen, X. A mode-dependent approach to state estimation of recurrent neural networks with Markovian jumping parameters and mixed delays. *Neural Networks* (2013), http://dx.doi.org/10.1016/j.neunet.2013.04.014

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A mode-dependent approach to state estimation of recurrent neural networks with Markovian jumping parameters and mixed delays

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Abstract

This paper is concerned with the problem of state estimation of recurrent neural networks with Markovian jumping parameters and mixed delays. A mode-dependent approach is proposed by constructing a novel Lyapunov functional, where some terms involving triple or quadruple integrals are taken into account. The advantage is that as many as possible of the Lyapunov matrices are chosen to be mode-dependent. Several design criteria are established under which the estimation error system is globally exponentially stable in the mean square sense. The gain matrices of the state estimator can be then found by solving a set of coupled linear matrix inequalities. It is shown in theory that better performance can be achieved by this approach. Furthermore, by introducing some scaling parameters, this approach is effectively employed to deal with the state estimation problem of the neural networks with complex dynamic behaviors, to which some existing results are not applicable.

Keywords: Recurrent neural networks, state estimation, time delays, Markovian jumping parameters, mode-dependent criteria, high-order integral terms.

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