Nonlinear Dynamics and Systems Theory, **20** (5) (2020) 535–541

Robust Stability of Markovian Jumping Neural Networks with Time-Varying Delays

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Received: May 31, 2018; Revised: November 17, 2020

Abstract: In this paper, global stability of recurrent neural networks with time-varying delays is considered. The uncertainity is considered in all the parameters of the concerned neural networks. A novel LMI-based stability criterion is obtained by using the Lyapunov functional theory to guarantee the asymptotic stability of recurrent neural networks with time-varying delays. Finally, a numerical example is given to demonstrate the correctness of the theoretical results.

Keywords: *Lyapunov functional; linear matrix inequality; recurrent neural networks; time-varying delays.*

Mathematics Subject Classification (2010): 34K20, 34K50, 92B20, 94D05.

1 Introduction

A recurrent neural network naturally involves dynamic elements in the form of feedback connections used as internal memories. Unlike the feedforward neural network whose output is a function of its current inputs only and is limited to static mapping, the recurrent neural network performs dynamic mapping. Recurrent networks are needed for the problems where there exists at least one system state variable which cannot be observed. Most of the existing recurrent neural networks are obtained by adding trainable temporal elements to the feedforward neural networks (such as multilayer perceptron networks [5] and radial basis function networks [2]) to make the output history sensitive. Like feedforward neural networks, this network function as block boxes and the meaning

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