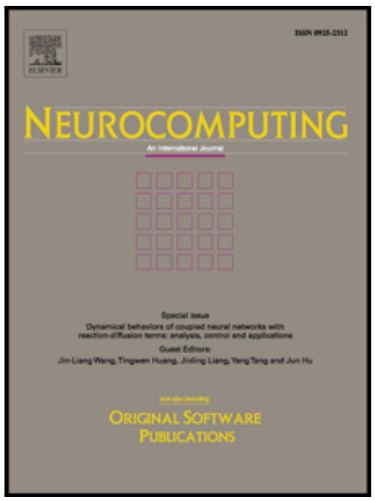

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New result for generalized neural networks with additive time-varying delays using free-matrix-based integral inequality method

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Abstract

This paper investigates the problem of stability for generalized neural networks (GNNs) with additive time-varying delays. Different from previous literatures, a new augmented Lyapunov-Krasovskii functional (LKF) has been constructed. In this LKF, two augmented terms are constructed to establish the interaction among the state vectors with additive time delay upper bounds. In addition, in consideration of the information for two upper bounds, a single and a double integral terms which contain the two upper bounds of additive time-varying delays are firstly introduced to analyze the GNNs. So, based on those treatments, the information about upper bound of additive time-varying delays is sufficiently used. On the other hand, the free-matrix-based integral inequality which can deal with the time-varying delays directly is employed to bound the derivative of the LKF. Based on above works, less conservative criterion is finally derived. Numerical example is provided to show the effectiveness and less conservatism of the proposed results.

Keywords: generalized neural networks (GNNs), additive time-varying delays, Lyapunov-Krasovskii functional (LKF), free-matrix-based integral inequality.

1. Introduction

As is well-known, neural network is one of the main branches of intelligent control technology. The development of neural network can affect the computer science, artificial intelligence, information science, automatic control, systems engineering and other fields. So, it had become an international frontier topic to study neural network. In the last few decades, many scholars had devoted themselves to the research of neural networks. And the neural networks have been successfully applied in the fields of image processing, signal processing, pattern recognition, associative memory, model identification and optimization problem [1], [2], [3], [4], [5], [6]. On the other hand, it is unavoidable that the delays are existing in a real neural networks for the inherent communication time between the neurons, finite switching speed of amplifiers and other reasons. As time delays may cause instability and poor

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