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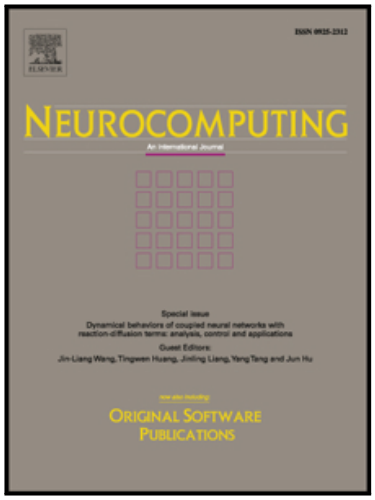

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Holistic adjustable delay interval method-based stability and generalized dissipativity analysis for delayed recurrent neural networks ☆

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Abstract

This paper is concerned with the generalized dissipativity analysis for the recurrent neural networks (RNNs) with time-varying delays. The generalized dissipativity analysis contains a few previous known results, such as the passivity, $(\mathcal{Q},\mathcal{R},\mathcal{S})$-dissipativity, H_∞ performance and $\mathcal{L}_2-\mathcal{L}_\infty$ performance in a unified framework. The delay interval with fixed terminals is changed into a dynamical one with adjustable delay interval based on convex combination technique (CCT), which is called adjustable delay interval method (ADIM). A novel augmented Lyapunov-Krasovskii functional (LKF) comprising triple integral terms and considering more information about neuron activation functions is constructed, in which the integral interval associated with delayed variables is not fixed. We give some sufficient conditions in terms of linear matrix inequalities(LMIs) to guarantee stability and generalized dissipativity of the considered neural networks. Finally, numerical examples are provided to demonstrate the effectiveness and less conservative of the obtained theoretical results.

Keywords: Generalized dissipativity, Adjustable delay interval method (ADIM), Convex combination technique (CCT), Linear matrix inequalities(LMIs)

1. Introduction

During the past two decades, recurrent neural networks (RNNs) has been extensively investigated and have been found a wide range of strong applications in various fields, such as signal and image processing,

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