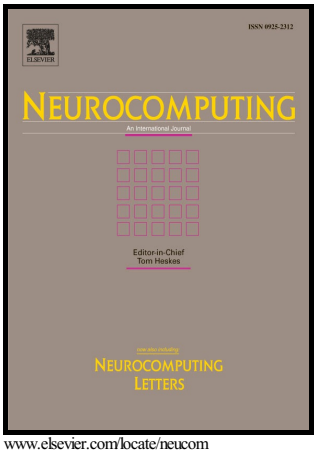

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Won Il Lee, Seok Young Lee, PooGyeon Park

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A combined reciprocal convexity approach for stability analysis of static neural networks with interval time-varying delays

Won Il Lee[a], Seok Young Lee[b], PooGyeon Park[a,*]

[a] *Department of Electronic and Electrical Engineering, Pohang University of Science and Technology, Pohang, Republic of Korea*
[b] *Division of IT Convergence Engineering, Pohang University of Science and Technology, Pohang, Republic of Korea*

Abstract

This paper proposes a novel approach called a combined reciprocal convexity approach for the stability analysis of static neural networks with interval time-varying delays. The proposed approach deals with all convex-parameter-dependent terms in the time derivative of the Lyapunov-Krasovskii functional non-conservatively by extending the idea of the conventional reciprocal convexity approach. Based on the proposed technique and a new Lyapunov-Krasovskii functional, two improved delay-dependent stability criteria are derived in terms of linear matrix inequalities(LMIs). Some numerical examples are given to demonstrate the proposed results.

Keywords: Reciprocal convexity approach, Interval time-varying delays, Stability analysis, Static neural networks

1. Introduction

During the past decades, neural networks (NNs) have been successfully applied in various applications such as signal processing, image processing, pattern recognition, associative memory, and combinatorial optimization [1, 2]. It is well known that NNs can be classified as local field NNs and static NNs depending on whether the neuron states or local field states of the neurons are chosen as basic variables to depict the evolution rules [3]. To the author's best knowledge, there are relatively few literatures on the studies of static NNs [4, 5, 6, 7, 8, 9, 10] whereas much attention has been paid to the analysis and synthesis of local field NNs [11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22]. The two systems can be transformed into the form of each other under some assumptions, however these assumptions are not established in many cases. Therefore, the study of static NNs is also important, which motivates this paper. For more details of the literature related to the relationship between local field NNs and static NNs, the reader is referred to [3, 23, 24].

*Corresponding author. Tel.: +82 54 279 2238; fax: +82 54 279 2903
Email address: ppg@posetch.ac.kr (PooGyeon Park)