Accepted Manuscript

Event-triggered $\mathcal{H}_\infty$ state estimation for semi-Markov jumping discrete-time neural networks with quantization

R. Rakkiyappan, K. Maheswari, G. Velmurugan, Ju H. Park

PII: S0893-6080(18)30161-8
DOI: https://doi.org/10.1016/j.neunet.2018.05.007
Reference: NN 3953

To appear in: *Neural Networks*

Received date : 14 August 2017
Revised date : 20 March 2018
Accepted date : 10 May 2018

Please cite this article as: Rakkiyappan, R., Maheswari, K., Velmurugan, G., Park, J.H., Event-triggered $\mathcal{H}_\infty$ state estimation for semi-Markov jumping discrete-time neural networks with quantization. *Neural Networks* (2018), https://doi.org/10.1016/j.neunet.2018.05.007

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

*Manuscript
Click here to view linked References
ACCEPTED MANUSCRIPT

Event-triggered $\mathcal{H}_\infty$ state estimation for semi-Markov jumping discrete-time neural networks with quantization

R. Rakkiyappan[1], K. Maheswari[2], G. Velmurugan[1], Ju H. Park[3,4]

[1] *Department of Mathematics, Bharathiar University, Coimbatore-641046, India.*
[2] *Department of Mathematics, Kumaraguru college of technology, Coimbatore-641049, India.*
[3] *School of Mathematical Sciences, Chongqing Normal University, Chongqing 401331, PR China*
[4] *Department of Electrical Engineering, Yeungnam University, 280 Daehak-Ro, Kyongsan 38541, Republic of Korea.*
Corresponding author: J.H. Park, email address: rakkigru@gmail.com (R. Rakkiyappan), jessie@ynu.ac.kr (J.H. Park)

Abstract

This paper investigates $\mathcal{H}_\infty$ state estimation problem for a class of semi-Markovian jumping discrete-time neural networks model with event-triggered scheme and quantization. Firstly, a new event-triggered communication scheme is introduced to determine whether or not the current sampled sensor data should be broad-casted and transmitted to the quantizer, which can save the limited communication resource. Secondly, a novel communication framework is employed by the logarithmic quantizer that quantifies and reduces the data transmission rate in the network, which apparently improves the communication efficiency of networks. Thirdly, a stabilization criterion is derived based on the sufficient condition which guarantees a prescribed $\mathcal{H}_\infty$ performance level in the estimation error system in terms of the linear matrix inequalities. Finally, numerical simulations are given to illustrate the correctness of the proposed scheme.

Keywords: Semi-Markov jump neural networks, exponential stability, $\mathcal{H}_\infty$ control, event-trigger scheme, quantization

1. Introduction

Neural networks have been extensively studied in the past few decades, due to their immense applications in various science and engineering fields such as signal processing, pattern recognition, optimization problems, associative memory, deep learning, robotics and approximation theory (Cochocki and Unbehauen (1993); Bishop (1995); Scardapane and Wang (2017); Carpenter (1989); Lai et al. (2016); Schmidhuber (2015); Cao et al. (2008); Chen and Cao (2016)). Recently, the theory of neural network operators was discussed based on the method of approximating functions by a neural process, that is, approximation by given sigmoidal functions of concern neural networks operators (Costarelli et al. (2014); Costarelli and Vinti (2016a,b,c, 2017)). It is worth noticing that these applications heavily depend upon the dynamical behaviors of such networks such as stability, instability, chaos and periodic oscillatory (Arik (2004); Cao and Wang (2004); He et al. (2016); Liu et al. (2017)). These networks consist of a great number of interconnected nodes, which exhibits topological properties. The stability analysis is one of the prerequisites for many of the engineering problems. So, the studies on stability analysis have gained significance in theory and in its application.

Recently, time delays have been profoundly studied as their presence leads to deteriorated performances in the dynamical systems. Time delays occur due to the finite switching speed of amplifiers and the communication time of neurons when the neurons in the neural networks are implemented in large-scale electronic circuits. The previous literature has witnessed a great number of research on various time-delays like the constant delays or the time-varying delays (Cao et al. (2016)), mixed time delays (Liu et al. (2014)), distributed delays (Wei et al. (2014)). As one of the problems of the sensor networks is its estimation, state estimation problems have been discussed in both continuous-time (Zhang and Yu (2012)) and discrete-time neural networks (Mou et al. (2008)). It is always assumed that time-delays are identical in the transmission of the neurons from one to other but they are different as the distance from one to another neuron is different. The existence of such de-

Download English Version:

https://daneshyari.com/en/article/6862917

Download Persian Version:

https://daneshyari.com/article/6862917

Daneshyari.com