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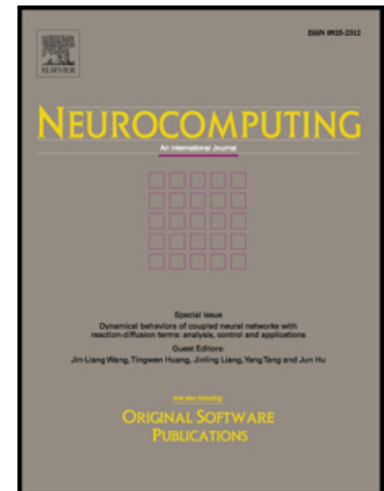
Weili Guo, Junsheng Zhao, Jinxia Zhang, Haikun Wei, Aiguo Song, Kanjian Zhang

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Stability Analysis of Opposite Singularity in Multilayer Perceptrons

Weili Guo¹, Junsheng Zhao², Jinxia Zhang¹, Haikun Wei¹, Aiguo Song³, Kanjian Zhang¹

¹ *Key Laboratory of Measurement and Control of CSE, Ministry of Education, School of Automation, Southeast University, Nanjing 210096, China*

² *School of Mathematics Science, Liaocheng University, Liaocheng 252059, China*

³ *School of Instrument Science & Engineering, Southeast University, Nanjing 210096, China*

E-mail address: hkwei@seu.edu.cn (H. Wei)

Abstract: For the bipolar-activation-function multilayer perceptrons (MLPs), there exist opposite singularities in the parameter space. The Fisher information matrix degenerates on the opposite singularity which causes strange learning behaviors. As the stability is the fundamental to analyze the properties of the opposite singularity, this paper concerns the stability analysis of the opposite singularity in MLPs. The analytical form of the best approximation on the opposite singularity is obtained at first, then the concrete expression of Hessian matrix can be obtained. By analyzing the eigenvalues of Hessian matrix on the opposite singularity, the stability of the opposite singularity is investigated. Finally, two experiments are taken to verify the obtained results.

Keywords: Stability analysis; Multilayer perceptrons; Opposite singularity; Hessian matrix; Best approximation.

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