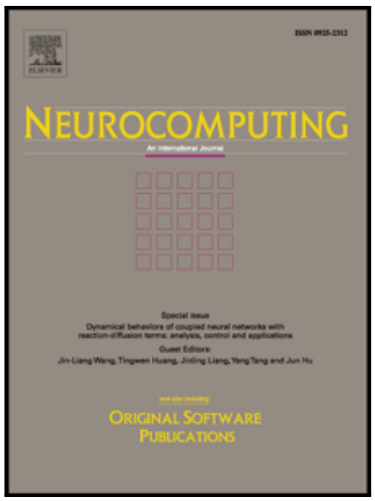

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PII: S0925-2312(17)30806-8
DOI: 10.1016/j.neucom.2017.04.052
Reference: NEUCOM 18404

To appear in: *Neurocomputing*

Received date: 25 September 2016
Revised date: 14 April 2017
Accepted date: 17 April 2017

Please cite this article as: Fangfang Luo, Wenzhong Guo, Yuanlong Yu, Guolong Chen, A Multi-Label ClassificationAlgorithm Based on Kernel Extreme Learning Machine, *Neurocomputing* (2017), doi: 10.1016/j.neucom.2017.04.052

A Multi-Label ClassificationAlgorithm Based on Kernel Extreme Learning Machine☆

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Abstract

Multi-label classification learning provides a multi-dimensional perspective for polysemic object, and becomes a new research hotspot in machine learning in recent years. In the big data environment, it is urgent to obtain a fast and efficient multi-label classification algorithm. Kernel extreme learning machine was applied to multi-label classification problem (ML-KELM) in this paper, so the iterative learning operations can be avoided. Meanwhile, a dynamic, self-adaptive threshold function was designed to solve the transformation from ML-KELM network's real-value outputs to binary multi-label vector. ML-KELM has the least square optimal solution of ELM, and less parameters that needs adjustment, stable running, faster convergence speed and better generalization performance. Extensive multi-label classification experiments were conducted on data sets of different scale. Comparison results show that ML-KELM outperformance in large scale dataset with high dimension instance feature.

Keywords: multi-label learning, extreme learning machine, kernel extreme learning machine, threshold selection

1. Introduction

Classification is an important data analysis technology, which is widely used in data mining, machine learning, pattern recognition and other fields. In traditional classification learning, each sample is only associated with a single category label which signifies a semantic meaning. This model is called "single label classification". At present, many accurate and efficient algorithms have been proposed for single label classification problem such as SVM, decision tree, naive Bayes method and artificial neural network. Although great progress has been made in research on single label classification, and they are widely used in the real life, but with the advent of the era of big data, the hypothesis of "one sample with single category label" cannot

☆This work was supported in part by the National Natural Science Foundation of China under Grant No. 61672159 and 61571129, the Fujian Collaborative Innovation Center for BigData Application in Governments, the Technology Innovation Platform Project of Fujian Province (Grant No.2009J1007 and 2014H2005), and the Fujian Natural Science Funds for Distinguished Young Scholars under Grant No. 2014J06017.

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