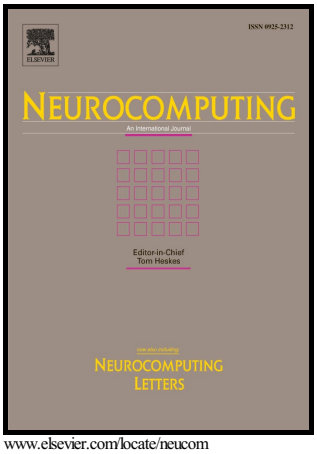
Author's Accepted Manuscript



www.elsevier.com/locate/neucom

Risk Upper Bounds for General Ensemble Methods with an application to Multiclass Classification

François Laviolette, Emilie Morvant, Liva Ralaivola, Jean-Francis Roy

PII: S0925-2312(16)31017-7
DOI: http://dx.doi.org/10.1016/j.neucom.2016.09.016
Reference: NEUCOM17544

To appear in: *Neurocomputing*

Received date: 7 March 2016
Revised date: 22 August 2016
Accepted date: 2 September 2016

Cite this article as: François Laviolette, Emilie Morvant, Liva Ralaivola and Jean Francis Roy, Risk Upper Bounds for General Ensemble Methods with an application to Multiclass Classification, *Neurocomputing* http://dx.doi.org/10.1016/j.neucom.2016.09.016

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 galley proof before it is published in its final citable 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.

ACCEPTED MANUSCRIPT

Risk Upper Bounds for General Ensemble Methods with an application to Multiclass Classification

François Laviolette

Département d'informatique et de génie logiciel, Université Laval, Québec, Canada
francois.laviolette@ift.ulaval.ca

Emilie Morvant

Univ Lyon, UJM-Saint-Etienne, CNRS, IOGS
Laboratoire Hubert Curien UMR 5516, F-42023, Saint-Etienne, France
emilie.morvant@univ-st-etienne.fr

Liva Ralaivola

Aix Marseille Univ., CNRS, Centrale Marseille, LIF, QARMA, Marseille, France
liva.ralaivola@lif.univ-mrs.fr

Jean-Francis Roy[†]

Coveo Solutions, Québec, Canada
jfroy@coveo.com

Accepted manuscript

Abstract

This paper generalizes a pivotal result from the PAC-Bayesian literature — the $\mathcal{C}$-bound— primarily designed for binary classification to the general case of ensemble methods of voters with arbitrary outputs. We provide a generic version of the $\mathcal{C}$-bound, an upper bound over the risk of models expressed as a weighted majority vote that is based on the first and second statistical moments of the vote's *margin*. On the one hand, this bound may advantageously be applied on more complex outputs than mere binary outputs, such as multiclass labels and multilabel, and on the other hand, it allows us to consider margin relaxations. We provide a specialization of the bound to multiclass classification together with empirical evidence that the presented theoretical result is tightly bound to the risk of the majority vote classifier. We also give insights as to how the

[†]This work was carried out while J.-F. Roy was affiliated with Université Laval, Canada.

Download English Version:

https://daneshyari.com/en/article/4948216

Download Persian Version:

https://daneshyari.com/article/4948216

Daneshyari.com