

A NOTE ON TALAGRAND'S CONVEX HULL CONCENTRATION INEQUALITY

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ABSTRACT. The paper reexamines an argument by Talagrand that leads to a remarkable exponential tail bound for the concentration of probability near a set. The main novelty is the replacement of a mysterious calculus inequality by an application of Jensen's inequality.

1. INTRODUCTION

Let \mathcal{X} be a set equipped with a sigma-field \mathcal{A} . For each vector $w = (w_1, \dots, w_n)$ in \mathbb{R}_+^n , the weighted Hamming distance between two vectors $x = (x_1, \dots, x_n)$ and $y = (y_1, \dots, y_n)$, in \mathcal{X}^n is defined as

Talagrand (1995, Section 4.1) proved a remarkable concentration inequality for

such as those based on the tensorization, as in Ledoux (1996), Boucheron, Lugosi, and Massart (2000), Massart (2003), and Lugosi (2003).

REFERENCES

Boucheron, S., G. Lugosi, and P. Massart (2000). A sharp concentration inequality with applications. *Random Structures and Algorithms* 16, 277–292.

Ledoux, M. (1996). On Talagrand's deviation inequalities for product measures. *ESAIM: Probability and Statistics* 1, 63–87.

Lugosi, G. (2003). Concentration-of-measure inequalities. Notes from the Summer School on Machine Learning, Australian National University. Available at <http://www.econ.upf.es/~lugosi/>.

Massart, P. (2003, July). Saint-Flour Lecture Notes. Available at <http://www.math.u-psud.fr/~massart/>.

Date: 13 January 2007.

2000 Mathematics Subject Classification. Primary 62E20. Secondary: 60F05, 62G08, 62G20.

Key words and phrases. Concentration of measure; convex hull; convexity.

Talagrand, M. (1995). Concentration of measure and isoperimetric inequalities in product spaces. *Publications Mathématiques de l'I.H.E.S.* 81, 73–205.

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