Pioneer Journal of Theoretical and Applied Statistics
Volume 2, Issue 2, Pages 71-86 (October 2011)

ISSN: 2230-9837

ON THE RATE OF CONVERGENCE OF NEAREST NEIGHBOR RULES IN PATTERN RECOGNITION

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Received May 17, 2011

Abstract

Psaltis et al. [On the finite sample performance of the nearest neighbor classifier, IEEE Trans. Inform. Theory 40 (1994), 820-837] derived an asymptotic representation of the finite sample risk of a nearest neighbor classifier under the Euclidean metric for a two-class problem. They assume bounded support and that the class-conditional distributions are absolutely continuous with densities admitting uniform asymptotic expansions, that the mixture density satisfies $f \geq c > 0$ and that one of the class-conditional densities vanishes close to the boundary of the support. In this paper, we assume that the last condition that one of the class-conditional densities vanishes close to the boundary of the support is violated, and based on an exact integral expression for the risk, we find an asymptotic evaluation of the finite sample risk of the nearest neighbor classifier for the normal and exponential distributions theoretically and numerically. This seems to be typical for the case of unbounded support.

Keywords and phrases: nearest neighbor classifier, pattern recognition, finite sample risk, rate of convergence, Laplace's method of integration.