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Limit theorems for multi-dimensional random quantizers

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Abstract

We consider the rth power quantization error arising in the optimal approximation of a d-dimensional probability measure P by a discrete measure supported by the realization of n i.i.d. random variables $X_1,...,X_n$. For all $d ≥ 1$ and $r in (0, ∞)$ we establish mean and variance asymptotics as well as central limit theorems for the rth power quantization error. Limiting means and variances are expressed in terms of the densities of P and X_1. Similar convergence results hold for the random point measures arising by placing at each $X_i, 1 ≤ i ≤ n,$ a mass equal to the local distortion.

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