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# Anisotropic oracle inequalities in noisy quantization

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The effect of errors in variables in quantization is investigated. We prove general exact and non-exact oracle inequalities with fast rates for an empirical minimization based on a noisy sample  $Z_i = X_i + \epsilon_i, i=1, \dots, n$ , where  $X_i$  are i.i.d. with density  $f$  and  $\epsilon_i$  are i.i.d. with density  $\eta$ . These rates depend on the geometry of the density  $f$  and the asymptotic behaviour of the characteristic function of  $\eta$ .

This general study can be applied to the problem of  $k$ -means clustering with noisy data. For this purpose, we introduce a deconvolution  $k$ -means stochastic minimization which reaches fast rates of convergence under standard Pollard's regularity assumptions.

Comments: 30 pages. arXiv admin note: text overlap with [arXiv:1205.1417](#)

Subjects: **Statistics Theory (math.ST)**; Machine Learning (stat.ML)

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