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A Multigrid Approach to Scalar Quantization

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A multigrid framework for the acceleration of the Lloyd-Max iterative descent process is presented. This process, which is a central building block in most quantization algorithms, iteratively improves a given initial solution and converges to a local minimum of the quantization distortion. Contrary to the classical Lloyd-Max process, the convergence of the multi-grid approach is practically independent of the number of representation levels sought. Using this approach, a local minimum with machine accuracy is reached in a matter of several iterations, and the need for traditional stopping criteria for the process is alleviated. In addition, the accelerated method is capable of achieving better local minima than the Lloyd-Max method.