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On the boundedness of sequences generated by stochastic gradient and random projection algorithms

We study the boundedness of sequences generated by two fundamental algorithmic frameworks: stochastic gradient methods and, as a special case, random projection algorithms. For the stochastic gradient method, we extend a result of Orvieto, Lacoste-Julien, and Loizou—originally established under strong convexity—to a broader class of functions, including coercive functions. In a complementary direction, we focus on random projection algorithms and generalize Meshulam's boundedness theorem from affine subspaces to polyhedral sets.