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Multidimensional analogs of the Hardy–Landau–Littlewood inequality with the Kantorovich norm

Abstract

The classical Hardy–Landau–Littlewood inequality estimates the square of the L^1-norm of the derivative of a function on the real line by the doubled product of the L^1-norms of the second derivative and the function itself. When applied to the difference of two probability densities, this inequality estimates the square of the total variation distance through the Kantorovich norm and the L^1-norm of the difference of the derivatives of these densities. The talk gives some multidimensional analogs of these bounds. In a number of interesting special situations (distributions of polynomials in Gaussian random variables, logarithmically concave measures, etc.), this yields bounds on the total variation distance via the Kantorovich distance and quantitative estimates for the total variation distance in case of weak convergence of distributions.