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Bit Complexity of Efficient Optimization

Optimization is a fundamental area in applied math, with applications ranging from economics to machine learning. There has been abundant interest in recent years in improving the asymptotic running times of algorithms for fundamental convex optimization problems. However, most of these works assume infinite precision for arithmetic operations. In this talk, we discuss the bit complexity of fundamental convex optimization problems under fixed-point arithmetic, including linear programming and p-norm regression. This requires analyzing the stability of the underlying inverse maintenance processes and how the errors propagate through the iterations.