STATISTICS

COLORADO STATE UNIVERSITY

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Elementary Landscapes, Gradients and Tunneling for MAX-kSAT and other NP-Hard Problems

Abstract

Elementary Landscapes, first discovered by Lov Grover, provide concise methods for computing summary statistics of local search neighborhoods for Graph Coloring and the Traveling Salesrep Problem. Using Fourier decompositions, this result can be extended to MAX-kSAT and all k-bounded Boolean functions (e.g. p-spin glasses). Using these same Fourier decompositions, it is simple to compute highly efficient gradients for all k-bounded Boolean functions. Finally, conditions also exist that make it possible to directly "tunnel" between local optima without quantum methods, automatically jumping from local optimum to local optimum; this can be done in *O(n)* time in the worst case and in *O(1)* time in the best case.