



Natural Evolution Strategies

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This paper presents Natural Evolution Strategies (NES), a recent family of algorithms that constitute a more principled approach to black-box optimization than established evolutionary algorithms. NES maintains a parameterized distribution on the set of solution candidates, and the natural gradient is used to update the distribution's parameters in the direction of higher expected fitness. We introduce a collection of techniques that address issues of convergence, robustness, sample complexity, computational complexity and sensitivity to hyperparameters. This paper explores a number of implementations of the NES family, ranging from general-purpose multi-variate normal distributions to heavy-tailed and separable distributions tailored towards global optimization and search in high dimensional spaces, respectively. Experimental results show best published performance on various standard benchmarks, as well as competitive performance on others.

Subjects: **Machine Learning (stat.ML)**; Neural and Evolutionary Computing (cs.NE)

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