Understanding the Parallel Efficiency of CMA-ES

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The Evolution Strategy with Covariance Matrix Adaptation (CMA-ES) is an effective population-based optimization algorithm that can be made more efficient by evaluating each iteration in parallel. We model the parallel efficiency of CMA-ES and use this to show that, for any objective function, there is always an optimal population size that minimizes the search time by balancing the serial complexity with a population size that minimizes the number of iterations necessary to converge. This research shows that, from a practical point of view, choosing the maximum number of processor available may actually increase the time it takes CMA-ES to optimize a particular function. We use our model to determine the optimal number of processors for a real-world application we have been working on.