Constrained Global Optimization: Multiprocessor Approach

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A collection of global optimization algorithms employing different types of a priory and accumulated information to boost the search for global optimum is presented in [1–4]. These schemes may easily be used as constituents for building some more sophisticated combined procedures that could be effectively accelerated being run on multiprocessor systems. Some of these possibilities are listed below.

If $\varphi(y)$ is a Lipschitzian function defined on the N-dimensional hypercube D then the N-dimensional global optimization problem by applying a Peano space-filling curve $y(x)$ can be reduced to a one-dimensional problem of minimizing $\varphi(y(x))$ over the interval [0, 1]. The reduced problem can be then solved by efficient algorithms [1, sec. 8.1]. Some of these algorithms allow effective parallelization [1, sec. 9.1–9.3]. Approximation techniques for computing $y(x)$ are also available [1, sec. 8.2]. To accelerate the search, a set of space-filling curves can be used [1, sec. 10.1] together with a smart parallel implementation [1, sec. 10.3].

Multi-dimensional global optimization problems with multiextremal partially defined constraints can also be reduced to a one-dimensional unconstrained problem [1, sec. 8.3] that can be then solved by the algorithm [4] allowing an effective parallelization, as well.

References

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