Breiman, Leo; Cutler, Adele

A deterministic algorithm for global optimization. (English) Zbl 0807.90103

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Consider the global optimization problem (1) $\max_{x\in X} f(x)$, where $f: X \to \mathbb{R}^1$ is a differentiable function and $X \subset \mathbb{R}^m$ is a compact polytope. To solve (1) the author presents a deterministic space covering algorithm strictly related to algorithms introduced in the literature by *B. O. Shubert* [SIAM J. Numer. Analysis 9, No. 3, 379–388 (1972; Zbl 0251.65052)] and by *R. H. Mladineo* [Math. Program. 34, 188–200 (1986; Zbl 0598.90075)]. While those authors assumed f to satisfy the Lipschitz condition, in this paper the following condition is assumed to hold:

$$f(x) \leq f(y) + \nabla f(y)'(x-y) + K\|x-y\|^2 \quad \text{for any } x, y \in X,$$

where K is a known constant. This leads to simpler geometric properties. The main idea of the algorithm is to construct a sequence of upper envelopes for f; their global maxima are easily found and converge to the solution of (1).

An implementation of the algorithm has been tested in solving standard test functions; the results are reported.

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