INTERACTIVE MODEL-BASED SEARCH FOR GLOBAL OPTIMIZATION

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Single-thread algorithms for global optimization differ in the way computational effort between exploitation and exploration is allocated. This allocation ultimately determines overall performance. For example, if too little emphasis is put in exploration, a globally optimal solution may not be identified. Increasing the allocation of computational effort to exploration increases the chances of identifying a globally optimal solution but it also slows down convergence. In this paper we propose a new algorithmic design for global optimization based upon multiple interacting threads. In this design, each thread implements a model-based search in which the allocation of exploration versus exploitation effort does not vary over time. Threads interact through a simple acceptance-rejection rule preventing duplication of search efforts. We show that the speed of convergence (both worst-case and average) increases exponentially in the number of threads. Thus, in the proposed algorithmic design, exploration is a complement and not a substitute to exploitation.