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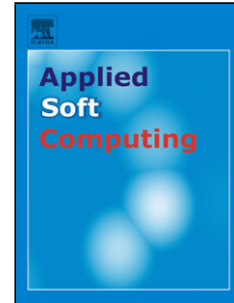
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Model-based Methods for Continuous and Discrete Global Optimization[☆]

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Abstract

The use of surrogate models is a standard method for dealing with complex real-world optimization problems. The first surrogate models were applied to continuous optimization problems. In recent years, surrogate models gained importance for discrete optimization problems. This article takes this development into consideration. The first part presents a survey of model-based methods, focusing on continuous optimization. It introduces a taxonomy, which is useful as a guideline for selecting adequate model-based optimization tools. The second part examines discrete optimization problems. Here, six strategies for dealing with discrete data structures are introduced. A new approach for combining surrogate information via stacking is proposed in the third part. The implementation of this approach will be available in the open source R package SPOT2. The article concludes with a discussion of recent developments and challenges in continuous and discrete application domains.

Keywords: Surrogate, Discrete optimization, Combinatorial optimization, Metamodels, Machine learning, Expensive optimization problems, Model management, Evolutionary computation

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