Automated, adaptive, and optimized search for CSPs via cuckoo search

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Constraint Programing is a programming paradigm devoted to the efficient solving of constraint satisfaction problems (CSPs). A CSP is a formal problem representation mainly composed of variables and constraints defining relations among those variables. The resolution process of CSPs is commonly carried out by building and exploring a search tree that holds the possibles solutions. Such a tree is dynamically created by interleaving two different phases: enumeration and propagation. During enumeration, the variables and values are chosen to build the possible solution, while propagation intend to delete the values having no chance to reach a feasible result. Autonomous Search is a new technique that gives the ability to the resolution process to be adaptive by re-configuring its enumeration strategy when poor performances are detected. This technique has exhibited impressive results during the last years. However, such a re-configuration is hard to achieve as parameters are problem-dependent and their best configuration is not stable along the search. In this paper, we introduce an Autonomous Search framework that incorporates a new optimizer based on Cuckoo Search able to efficiently support the re-configuration phase. Our goal is to provide an automated, adaptive, and optimized search system for CSPs. We report encouraging results where our approach clearly improves the performance of previously reported Autonomous Search approaches for CSPs.

Autonomous search

Constraint programming

Cuckoo search

Nature-inspired algorithms

Swarm-based optimization

Artificial intelligence

Computer programming

Constraint theory

Forestry

Optimization

Autonomous searches

Constraint programming

Cuckoo searches

Defining relations

Nature inspired algorithms

Problem representation

Programming paradigms

Resolution process

Constraint satisfaction problems