WSM tuning in autonomous search via gravitational search algorithms

Soto R.

Crawford B.

Herrera R.

Olivares R.

Johnson F.

Paredes F.

Autonomous search is a recent approach that allows the solver to adapt their search so as to be more efficient without the manual configuration of an expert user. The goal is to provide more capabilities to the solver in order to improve the search process based on some performance indicators and self-tuning. This approach has effectively been applied to different optimization and satisfaction techniques such as constraint programming, SAT, and various metaheuristics. This paper focuses on automated self-tuning of constraint programming solvers. We employ a classic decision making method called weighted sum model (WSM) to evaluate the search process performance. This evaluation is used by the solver to re-configure its parameters in benefit of reaching a better performance. However, reaching good configurations straightly depends on the correct tuning of the WSM. This is known to be hard as the WSM is problem-dependent and good settings are not commonly stable along the search. To this end, we introduce a gravitational search algorithm (GSA), which is able to find good WSM configurations when solving constraint satisfaction problems. We illustrate experimental results where the GSA-based approach directly competes against previously reported autonomous search methods for constraint programming.

Adaptive Systems

Constraint Satisfaction

Gravitational Search

Optimization

Adaptive systems

Algorithms

Artificial intelligence

Computer programming

Constraint theory

Decision making

Learning algorithms

Optimization

Social networking (online)

Autonomous searches

Constraint programming

Constraint Satisfaction

Decision-making method

Gravitational Search

Gravitational search algorithm (GSA)

Gravitational search algorithms

Performance indicators

Constraint satisfaction problems