Sparkle
Accessible Meta-Algorithmics for Improving the State of the Art in Solving Challenging Problems

Koen van der Blom¹, Holger Hoos¹², Chuan Luo¹, Jeroen Rook¹
¹Leiden University, ²University of British Columbia

Background
- Benchmarks and competitions advance the state of the art
- Meta-algorithms advance the state of the art by getting the most out of existing algorithms
- Meta-algorithms are complex, difficult to use correctly, and computationally expensive

Meta-algorithms
- Algorithm selection takes advantage of complementary strengths of different algorithms
- Algorithm configuration carefully chooses parameter settings and algorithm components

Sparkle
Best practices and pitfall avoidance
- Standard protocols for selection and configuration
- Handle running time measurement, target algorithm termination, etc.

Reporting
- Used instance set(s), solver(s), etc.
- Experimental procedure
- Results

Simple commands
1. Commands/initialise.py
2. Commands/add_instances.py path/to/PTN/
3. Commands/add_solver.py --deterministic 0 path/to/PbO-CSCCSAT-Generic/
4. Commands/add_solver.py --deterministic 0 path/to/CSCCSat/
5. Commands/add_solver.py --deterministic 0 path/to/MiniSAT/
6. Commands/add_feature_extractor.py --run-extractor-later path/to/SAT-features-competition2012_sparkle/
7. Commands/compute_features.py
8. Commands/run_solvers.py
9. Commands/construct_sparkle_portfolio_selector.py
10. Commands/generate_report.py

Example: Algorithm selection for SAT solving

Marginal contribution: How valuable is this solver to the selector
Results from the Sparkle Planning Challenge 2019

Summary
State of the art
- Advanced by benchmarks, competitions, meta-algorithms
- Accurate assessment requires meta-algorithms

Meta-algorithms
- Get the most out of existing algorithms
- Computationally expensive and hard to use correctly

Sparkle
- Use meta-algorithms easily and correctly
- Standard protocols, best practices, and pitfall avoidance
- Advance and assess the state of the art

Try Sparkle
SAT, Planning, TSP, MIP, …

Project page: https://bitbucket.org/sparkle-ai/sparkle/

Analysis tools: Ablation analysis