Intelligent Constraint Programming: Algorithm Selection for Fun and Profit

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FlatZinc implementations

The MiniZinc library contains direct interfaces to COIN-OR CBC, Gurobi and IBM ILOG CPLEX. Furthermore, the following projects have developed FlatZinc interfaces:

- **Gecode/FlatZinc.** The generic constraint development environment provides a FlatZinc interface. The source code for the interface stripped of all Gecode-specific code is also available.
- **Chuffed.** A C++ FD solver using lazy clause generation.
- **Choco 3.** A Java FD solver.
- **ECLiPSe.** The ECLiPSe Constraint Programming System provides support for evaluating FlatZinc using ECLiPSe's constraint solvers. MiniZinc models can be embedded into ECLiPSe code in order to add user-defined search and I/O facilities to the models.
- **HalfaCSP.** A C++ FD solver using SAT solving algorithms.
- **JaCoP.** A Java-based constraint solver with an interface to FlatZinc (from version 4.2).
- **MinisatID.** An implementation of a search algorithm combining techniques from the fields of SAT, SAT Module Theories, Constraint Programming and Answer Set Programming, has an interface to FlatZinc.
- **Mistral 2.0.** A C++ FD solver.
- **Opturion CPX.** A Constraint Programming solver with eXplanation system, has an interface to FlatZinc.
- **OR-Tools.** A set of Operations Research tools developed at Google.
- **OscaR/CBLS.** A FlatZinc interface to the Constraint Based Local Search component of the OscaR toolkit.
- **Picat CP/SAT.**
- **SICStus Prolog.** Includes a library for evaluating FlatZinc (from version 4.0.5).
- **SCiP.** A framework for Constraint Integer Programming, has an interface to FlatZinc.
- **Yuck.** A local search solver with an interface to FlatZinc.
MiniZinc challenge

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Algorithm Selection to the Rescue!
Algorithm Selection to the Rescue!

▷ Sunny
MiniZinc challenge
Algorithm Selection to the Rescue!

▷ Sunny
Algorithm Selection to the Rescue!

▷ Sunny
▷ (SAT)zilla
Algorithm Selection to the Rescue!

▷ Sunny
▷ (SAT)zilla
▷ LLAMA
Algorithm Selection to the Rescue!

- Sunny
- (SAT)zilla
- LLAMA
- ...

...
Algorithm Selection challenge

Challenges

▷ Algorithm Selection in every solver!
Challenges

▷ Algorithm Selection in every solver!
▷ Model portfolios
Challenges

▷ Algorithm Selection in every solver!
▷ Model portfolios
▷ Super-franken-model-representation-solver portfolios
Challenges

▷ Algorithm Selection in every solver!
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Go Forth and Constrain!
I’m hiring!

several funded PhD positions available, focus on algorithm selection and configuration, meta-learning, combinatorial problems

(not the view from my office)