Solving qualified constraint satisfaction problems with value selection rules

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Problems & Ideas

• Quantified Constraint Satisfaction Problems (QCSP)
  • Solving QCSPs is usually a hard task
  • PSPACE-complete
  • The best exact solver is based on backtracking

• Two new value heuristic rules with history information
  • When assigning a universally quantified variable:
    assign the latest failure value
    fail-first principle
  • When assigning an existentially quantified variables:
    record the latest success assignments
    such assignments are tried preferentially when exploiting other branches
    promise principle
Main Contributions

• Comparison on average runtimes of four algorithms,

Ori: original solver, Exi: our rule for existentially quantified variables, Uni: our rule for universally quantified variables, Exi+Uni: both rules.

• Exi+Uni is 2-10 times faster than the original solver