

castella: a SAT-based system for solving the path counting problem

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Castella is a SAT-based system for solving the path counting problem (PCP). The task of PCP is to count all paths that satisfy certain constraints on a given graph (i.e., all solutions of a path finding problem). We develop a constraint modeling that represents path finding problems as constraint satisfaction problems (CSPs). Figure 1 shows the architecture of *castella*. The *castella* solver generates a CSP for a given PCP instance of an extended DIMACS format, and then translates it into SAT by using *Sugar* [1].¹ In turn, the total number of paths is calculated by using SAT model counting solvers, in our case *GPMC* [2].²

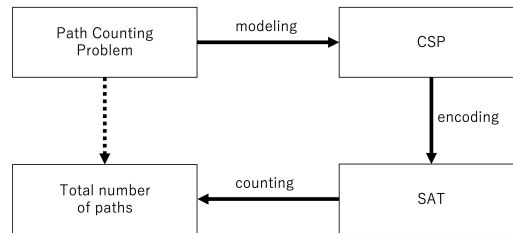


Figure 1: The architecture of the *castella* solver

References

- [1] Naoyuki Tamura, Tomoya Tanjo, and Mutsunori Banbara. Compiling Finite Linear CSP into SAT, *CONSTRAINTS*, 14(2): pp.254–272, 2009
- [2] Ryosuke Suzuki, Kenji Hashimoto, and Masahiko Sakai. Improvement of Projected Model-Counting Solver with Component Decomposition Using SAT Solving in Components, *JSAI Technical Report*, SIG-FPAI-103-B506, pp.31-36, 2017 (in Japanese).

¹<https://cpsat.gitlab.io/sugar/>

²<https://git.trs.css.i.nagoya-u.ac.jp/k-hasimt/GPMC>