CONFident at the 2023 Confluence Competition*

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CONFident 2.0 is a tool which is able to prove confluence of TRSs, CS-TRSs, CTRSs and CS-CTRSs. The tool is available here:

http://zenon.dsic.upv.es/confident/.

It is written in Haskell implementing the Confluence Framework:

- we consider two types of problems: *confluence problems* and *joinability problems*. Confluence problems encapsulate the different variants of rewrite systems. Joinability problems encapsulate any possible type of critical pair generated by rewrite systems.
- processors are partial functions that are applied to problems. Our processors encapsulate techniques for simplification, modular decomposition, problem transformation and direct confluence/joinability checks.

We implement these processors using the logical approach presented in [1, 3, 5] and mechanizing them by external tools like MU-TERM [3], infChecker [1], AGES [2], Prover9 and Mace4 [7] and Barcelogic[1]. Latest description of the tool can be found in [4].

References

[1] R. Gutiérrez and S. Lucas. Automatically Proving and Disproving Feasibility Conditions. In N. Peltier and V. Sofronie-Stokkermans, editor, *Proc. of IJCAR'2020*, LNCS 12167:416–435. Springer, 2020.

[2] R. Gutiérrez and S. Lucas. Automatic Generation of Logical Models with AGES. In *CADE 2019: Automated Deduction - CADE 27*, LNCS 11716:287:299. Springer, 2019.

[3] R. Gutiérrez and S. Lucas. MU-TERM: Verify Termination Properties Automatically (System Description). In N. Peltier and V. Sofronie-Stokkermans, editor, *Proc. of IJCAR'2020*, LNCS 12167:436–447. Springer, 2020.

[4] R. Gutiérrez, M. Vítores and S. Lucas. Confluence Framework: Proving Confluence with CONFident. In A. Villanueva, editor, *Proc. of LOPSTR'2022*, LNCS 13474:24–43. Springer, 2022.

[5] S. Lucas. Proving semantic properties as first-order satisfiability. *Artificial Intelligence* 277, paper 103174, 24 pages, 2019.

[6] S. Lucas and R. Gutiérrez. Use of Logical Models for Proving Infeasibility in Term Rewriting. *Information Processing Letters*, 136:90–95, 2018.

[7] W. McCune. Prover9 and Mace4. [online]. Available at https://www.cs.unm.edu/~mccune/mace4/.

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[1] https://barcelogic.com/