CoCo 2015 Participant: ConCon[*]

Thomas Sternagel and Aart Middeldorp

Institute of Computer Science, University of Innsbruck, Austria
{thomas.sternagel, aart.middeldorp}@uibk.ac.at

ConCon is a fully automatic confluence checker for *oriented* first-order conditional term rewrite systems (CTRSs). The tool implements three known confluence criteria:

(A) A quasi-decreasing strongly irreducible deterministic 3-CTRS $\mathcal{R}$ is confluent if and only if all critical pairs of $\mathcal{R}$ are joinable [1].

(B) Almost orthogonal properly oriented right-stable 3-CTRSs are confluent [6].

(C) A weakly left-linear deterministic CTRS $\mathcal{R}$ is confluent if $\mathbb{U}(\mathcal{R})$ is confluent [2].

We refer to [4] for a more detailed description of the above results. ConCon is written in Scala 2.11 and available under the LGPL license. It can be downloaded from:

http://cl-informatik.uibk.ac.at/software/concon/

A web interface can also be found there. For some of the methods ConCon issues calls to the external unconditional confluence and termination checkers CSI and T$_T$T$_2$ as well as the theorem prover Waldmeister.

To make criteria (A) and (B) more useful, we implemented a variety of methods to check for infeasibility of conditional critical pairs, ranging from a simple technique based on the tcap function, via different implementations of tree automata completion, to equational reasoning. These are described in [5]. Another recent extension is certifiable output for method (C),[1] which is made possible due the formalization efforts described in [7] as well as certifiable output for method (B) due to the formalization described in [3]. Future extensions will include support for *join* and *semi-equational* CTRSs.

References

[1] J. Avenhaus and C. Loría-Sáenz. On conditional rewrite systems with extra variables and deterministic logic programs. In *Proc. 5th LPAR*, volume 822 of *LNAI*, pages 215–229, 1994.

[2] K. Gmeiner, N. Nishida, and B. Gramlich. Proving confluence of conditional term rewriting systems via unravelings. In *Proc. 2nd IWC*, pages 35–39, 2013.

[3] C. Sternagel and T. Sternagel. Level-confluence of 3-CTRSs in Isabelle/HOL. In *Proc. 4th IWC*, 2015. This volume.

[4] T. Sternagel and A. Middeldorp. Conditional confluence (system description). In *Proc. Joint 25th RTA and 12th TLCA*, volume 8560 of *LNCS*, pages 456–465, 2014.

[5] T. Sternagel and A. Middeldorp. Infeasible conditional critical pairs. In *Proc. 4th IWC*, 2015. This volume.

[6] T. Suzuki, A. Middeldorp, and T. Ida. Level-confluence of conditional rewrite systems with extra variables in right-hand sides. In *Proc. 6th RTA*, volume 914 of *LNCS*, pages 179–193, 1995.

[7] R. Thiemann and S. Winkler. Formalizing soundness and completeness of unravelings. In *Proc. 10th FroCoS*, LNAI, 2015. To appear.

---

[1]We are grateful to Sarah Winkler for this extension.