CoCo 2017 Participant: ConCon 1.5*

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ConCon is a fully automatic confluence checker for *oriented* first-order conditional term rewrite systems (CTRSs). It is written in Scala and available under the LGPL license. You can use its web interface or download it at

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

For some of its methods ConCon issues calls to the external unconditional confluence and termination checkers CSI and T$_{\text{T}}$T$_2$ as well as the theorem prover Waldmeister. For a full system description of an earlier version of ConCon see [4]. ConCon first tries to simplify rules and remove infeasible rules from the input system, then it employs the following three confluence criteria:

(A) a quasi-decreasing strongly deterministic 3-CTRS is confluent if all its critical pairs are joinable [1],

(B) an almost orthogonal extended properly oriented right-stable 3-CTRS is confluent [7],

(C) a deterministic 3-CTRS $\mathcal{R}$ is confluent if its unraveling $\mathsf{U}(\mathcal{R})$ is left-linear and confluent [8].

In parallel ConCon also tries to show non-confluence using conditional narrowing (and some other heuristics). To make criteria (A) and (B) more useful, ConCon uses a variety of methods to check for infeasibility [5] of conditional critical pairs, ranging from a simple technique based on unification, via symbol transition graph analysis, reachability problem decomposition, the exploitation of certain equalities in the conditions, and tree automata completion to equational reasoning. ConCon can generate certifiable output for all implemented methods [2,3,6,8] except the infeasibility check employing equational reasoning via Waldmeister.

References

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