CoCo 2017 Participant: CeTA 2.31*

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Automatic provers have become popular in many areas like theorem proving, SMT, etc. Since such provers are complex pieces of software, they might contain errors that lead to wrong answers, i.e., incorrect proofs. Therefore, certification of the generated proofs is of major importance.

The tool CeTA [9] is a certifier that can be used to certify confluence and non-confluence proofs of term rewrite systems (TRSs) and conditional term rewrite systems (CTRSs). Its soundness is proven as part of IsaFoR, the *Isabelle Formalization of Rewriting*. The following techniques are currently supported in CeTA—for further details we refer to the certification problem format (CPF) and to the sources of IsaFoR and CeTA (`http://cl-informatik.uibk.ac.at/ceta/`).

Term rewrite systems. For terminating systems CeTA can check confluence via the critical pair lemma. For possibly non-terminating TRSs CeTA supports several criteria based on linearity and restricted joinability of critical pairs [3], the rule labeling heuristic [4], addition and removal of redundant rules [2], and, since 2017, terminating critical-pair-closing systems [5]. To certify non-confluence one can provide a divergence and a certificate for non-joinability, based on distinct normal forms, *tcap*, interpretations, or tree automata [1].

Conditional term rewrite systems. For CTRSs CeTA supports: certifying confluence of almost orthogonal, properly oriented, right-stable 3-CTRSs [6]; unraveling, a technique for transforming a given CTRS into a TRS; and, since 2017, certifying confluence of quasi-decreasing strongly deterministic CTRSs, possibly employing the new *inlining* technique [7]. Also new in 2017 is support for certifying non-confluence methods [8].

References

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