CoCo 2015 Participant: CSIˆho 0.1*

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Higher-order rewriting combines standard, first-order rewriting with notions and concepts from the λ-calculus, resulting in rewriting systems with higher-order functions and bound variables. CSIˆho is a tool for automatically proving confluence of such higher-order systems, specifically pattern rewrite systems (PRSs) as introduced by Nipkow [2,3]. The restriction to pattern left-hand sides is essential for obtaining decidability of unification and thus makes it possible to compute critical pairs. To this end CSIˆho implements a version of Nipkow's algorithm for higher-order pattern unification [4].

CSIˆho is built on top of CSI [8], a powerful confluence prover for first-order term rewrite systems, and is available from

http://cl-informatik.uibk.ac.at/software/csi/ho/

Using CSI as foundation, CSIˆho inherits many of its attractions, in particular a strategy language, which allows for flexible configuration. The following confluence criteria are currently supported in CSIˆho:

- Knuth and Bendix' criterion, that is, for terminating PRSs we decide confluence by checking joinability of critical pairs [3]. This is currently the only method CSIˆho implements for proving non-confluence. For showing termination the supported techniques are a basic higher-order recursive path ordering [7] and static dependency pairs with dependency graph decomposition and the subterm criterion [1].
- Weak orthogonality [6], i.e., left-linearity and $s = t$ for all critical pairs $s \leftarrow\!\rtimes\!\rightarrow t$.
- Van Oostrom's development closed critical pair criterion [5]. That is, we conclude confluence of a left-linear PRS if $\leftarrow\!\rtimes\!\rightarrow \subseteq \twoheadrightarrow$ and $\leftarrow\!\bowtie\!\rightarrow \subseteq \twoheadrightarrow \cdot {}^*\!\leftarrow$. Here we approximate $\rightarrow^*$ by $\twoheadrightarrow$.

References

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