CoCo 2015 Participant: CSI^ho 0.1*

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Higher-order rewriting combines standard, first-order rewriting with notions and concepts from the \(\lambda\)-calculus, resulting in rewriting systems with higher-order functions and bound variables. CSI^ho 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 CSI^ho implements a version of Nipkow’s algorithm for higher-order pattern unification [4].

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

- 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 CSI^ho 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 \(s \leftarrow \ast \rightarrow t\).

- Van Oostrom’s development closed critical pair criterion [5]. That is, we conclude confluence of a left-linear PRS if \(\leftarrow \ast \rightarrow \subseteq \Rightarrow\) and \(\leftarrow \ast \rightarrow \subseteq \Rightarrow \ast \leftarrow\). Here we approximate \(\Rightarrow\) by \(\Rightarrow\).

References


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