CoCo 2012 Participant: CSI*

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CSI is an automatic tool for (dis)proving confluence of first-order term rewrite systems (TRSs). Its name is derived from the Confluence of the rivers Sill and Inn in Innsbruck. The tool is open source and available from

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

CSI is based on the termination prover $\mathsf{T_{T}T_{2}}$. The main features and at the same time the major attractions of CSI are listed below. Several of these are described in more detail in [6].

- CSI is equipped with a strategy language, which allows to configure it flexibly. A web interface is also available.

- CSI implements the decreasing diagrams technique in a modular way, where different labelings can be combined lexicographically to obtain decreasingness.

- CSI supports decomposing TRSs into smaller TRSs based on ordered sorts (subtypes). This criterion is strictly stronger than a decomposition based on plain sorts. Apart from Knuth and Bendix' criterion this is currently the only method inside CSI which is applicable to non-left-linear systems.

- CSI features an efficient decision procedure for confluence of ground TRSs [2] that runs in cubic time in terms of the TRS size.

- Our non-confluence techniques employ methods from termination analysis, namely tcap, and tree automata techniques. For counterexamples to confluence we currently start with critical peaks. However, as shown in [3] this is not always sufficient, even for linear TRSs.

- CSI can produce proofs in cpf format that can be verified by certifiers like CeTA [5].

We conclude by mentioning a topic concerning future work. Currently, CSI is not very powerful for TRSs which are neither terminating nor left-linear. This is not due to the basic design but due to lack of techniques dedicated to this class of problems. Here ACP [1] and Saigawa [4] are clearly superior to our prover.

References

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