CoCo 2019 Participant: ConCon 1.9*

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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 at

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

For more details on its implementation and employed methods we refer to an earlier system description [2].

Apart from some refactoring to cater for the new INF category (for infeasibility) of CoCo the most significant new feature in ConCon 1.9 is its use of the external ordered completion tool MædMax [4] for proving infeasibility. This new technique comes with certificate generation and can be certified [1] by CeTA [3] since version 2.36.

CoCo 2019. Unfortunately, the above mentioned refactoring did have its price: In the *Confluence Competition* 2019 ConCon 1.9 had YES/NO conflicts (on Cops #869, #870, #854, #874, #858, #875, and #909) with the tool infChecker in the new INF category. Moreover, we noticed that despite there being no conflicts, there were answers in the CTRS category that we could not reproduce with the bugfix version 1.9.1 of ConCon. Therefore, ConCon dropped out of both of the above categories. (The problem was a flipped Boolean flag in the *exact tree automata completion* method that was inadvertently introduced during refactoring.)

On the one hand, this clearly shows the need for certification. On the other hand, it may be interesting to note, that in the *certified* CPF-CTRS category (were ConCon+CeTA was the only participant this year) ConCon could prove (non)confluence of 1.3 times as many CTRSs than the winner of the *non certified* CTRS category.

References

[1] C. Sternagel and S. Winkler Certified Equational Reasoning via Ordered Completion In *Proc. 27th CADE*, 2019, to appear.

[2] T. Sternagel, C. Sternagel, and A. Middeldorp CoCo Participant 2018: ConCon 1.5. In *Proc. 7th IWC*, 2018. http://cl-informatik.uibk.ac.at/events/iwc-2018/iwc2018.pdf

[3] R. Thiemann and C. Sternagel Certification of Termination Proofs using CeTA. In *Proc. 22nd TPHOLs*, volume 5674 of *LNCS*, pages 452–468, 2009. doi: doi:10.1007/978-3-642-03359-9_31.

[4] S. Winkler and G. Moser MædMax: A Maximal Ordered Completion Tool In *Proc. 9th IJCAR*, volume 10900 of *LNCS*, pages 472–480, 2018. doi: 10.1007/978-3-319-94205-6_31.

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