

## Formalizing the Dependency Pairs Criterion for Term Rewriting Systems

Ariane Alves Almeida  
PPGInf - CIC - UnB

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**Abstract.** Although undecidable, termination is a relevant property for term rewriting systems. There are several methods of semi-decision to address the analysis of termination, among them, the dependency pairs termination criterion, which was introduced in the 1990s by Arts and Giesl [1] and has been extensively studied ever since. In this criterion, the relations between pairs of expressions rooted by defined symbols on the left- and right-hand sides of rewriting rules, are analyzed. If there exists a well-founded order compatible with all these pairs, the criterion states termination of the system. It will be presented a computational formalization of the theorem that establishes correctness of this criterion, for both the standard reduction of TRS and for the innermost rewriting strategy, highlighting the difference between them. Indeed, will be stated that noetherianity of a term rewriting system is equivalent to termination of the system through the dependency pairs criterion for both standard and innermost rewriting strategies.

### References

- [1] T. Arts, J. Giesl, *Proving innermost normalisation automatically*, in: H. Comon (Ed.), *Lecture Notes in Computer Science*, vol. 1232, Springer, 1997, pp. 157–171.
- [2] T. Arts and J. Giesl. 2000. *Termination of term rewriting using dependency pairs*. *Theor. Comput. Sci.* 236, 2000, 133-178.