Context-Sensitive AC-rewriting

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Context-sensitive rewriting was introduced in [1] and consists of syntactical restrictions imposed on a Term Rewriting System indicating how reductions *can* be performed; this is achieved by associating to each function symbol a set of positions, namely the positions where reductions can be performed. So *context-sensitive rewriting* is a restriction of the usual rewrite relation which reduces the reduction space and allows for a finer control of the reductions of a term and is related to lazy evaluation strategies in functional languages.

We extended the concept of context-sensitive rewriting to rewriting modulo an AC-theory by restricting both rewrite steps and AC-steps, and we studied the termination properties of context-sensitive AC-rewriting following the approach of Zantema [2] for context-sensitive rewriting. Context-sensitive (AC) termination, or μ-termination is a more general property than (AC) termination since this last property implies the former but not vice-versa, thus context-sensitive relations can also be used to study termination properties of reduction strategies for systems that are not terminating. We present two techniques for proving μ-AC-termination: the first method provides a complete technique and consists in the definition of a suitable interpretation algebra for the (restricted) AC-rewrite system and the context-sensitive AC-rewrite relation, then μ-AC-termination of a system R/AC can be concluded from the existence of such a suitable interpretation. The second method consists in transforming the (restricted) AC-rewrite system and the context-sensitive relation in an non-restricted AC-rewrite system where the reduction relation considered is the usual AC-rewrite relation; μ-AC-termination of the original system can be inferred from AC-termination of the transformed system. The advantage of this method over the previous one is that usual well-known techniques for proving AC-termination can be used to infer μ-AC-termination.

References

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[2] H. Zantema. Termination of context-sensitive rewriting. In *Proceddings of the 8th International Conference on Rewriting Techniques and Applications, RTA'97*, Lecture Notes in Computer Science. Springer, 1997.