Uniform Semi-Unification and Anchored Semi-Unification (extended abstract)

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Semi-unification is an extension of unification. Various variants of semi-unifications were proposed until now. In general, semi-unification is undecidable. In particular, it is well-known that uniform semi-unification is decidable. Kapur et al. [2] and Oliart & Snyder [3] studied efficient algorithms of uniform semi-unification. Also, Aoto & Iwami revisited termination of rule-based calculi for uniform semi-unification [1]. Recently, Smolka & Tebbi proposed anchored semi-unification for solving unification modulo nonnested recursion schemes [4].

Any left-hand side of rewrite rule in recursion scheme $\mathcal{S}$ is a form $f(x_1, \ldots, x_n)$ where f is a function symbol and $x_1, \ldots, x_n$ are distinct variables. For example, $\mathsf{f}(\mathsf{h} \cdot y, x)$ does not occur in any left-hand side of rewrite rule in recursion scheme $\mathcal{S}$. The inequations of anchored semi-unification problem are based on a terms occur in the rewrite rules of $\mathcal{S}$. For example, $\mathsf{f}(\mathsf{h} \cdot y, x)$ does not occur in any left-hand side of inequations of anchored semi-unification problem.

So, there are restrictions of terms occur in an inequations of anchored semi-unification problem. However, there is no restriction of terms occur in an inequations of uniform semi-unification problem. For instance, $E = \{\mathsf{f}(\mathsf{h} \cdot y, x) \leqslant \mathsf{f}(x, \mathsf{h} \cdot \mathsf{h} \cdot y)\}$ can not solve using the method of anchored semi-unification.

Therefore, we consider it is not sufficient to compare anchored semi-unification with uniform semi-unification in [4], since we consider they did not discuss about terms occur in inequations of these two semi-unification problems.

In this talk, we will introduce our ongoing work to clear differences between uniform semi-unification and anchored semi-unification.

References

[1] T. Aoto and M. Iwami. Termination of rule-based calculi for uniform semi-unification. In *Proc. the 7th International Conf. on Language and Automata Theory and Applications (LATA) 2013*, volume 7810 of *LNCS*, pages 56–67. Springer-Verlag, 2013.

[2] D. Kapur, D. Musser, P. Narendran, and J. Stillman. Semi-unification. *Theoretical Computer Science*, 81(2):169–187, 1991.

[3] A. Oliart and W. Snyder. Fast algorithms for uniform semi-unification. *Journal of Symbolic Computation*, 37(4):455–484, 2004.

[4] G. Smolka and T. Tebbi. Unification modulo nonnested recursion schemes via anchored semi-unification. In *Proc. of the 24th International Conf. on Rewriting Techniques and Applications (RTA) 2013*, pages 271–286, 2013.