On Termination and Derivation Lengths for Ground Rewrite Systems

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Abstract. It is shown that for terminating ground term rewrite systems the length of derivations is linearly bounded in the size of the starting term. (The constant of the linear bound, however, depends exponentially on the cardinality of the signature.) This is proven by constructing a termination proof via a suitable interpretation into the natural numbers.

Terminating ground systems are not necessarily ω-terminating, i.e., a monotone interpretation over ω might not exist. As an example, consider the system with the two rules $g(a) \to g(b)$ and $f(b) \to f(a)$. We show, however, that those systems are "almost ω-terminating" in the sense that a monotone interpretation over a well-founded ordering of the form $\alpha + \omega$ can always be constructed where α is a finite partially ordered set.

In the second part of my talk, it is shown how to apply the theory of tree languages to decision problems related to ground systems, e.g., termination, normalization, fair termination. Extensions of known results to regular canonical (string and tree) systems are given.