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Decreasing Diagrams and Relative Termination

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Abstract In this article we use the decreasing diagrams technique to show that a left-linear and locally confluent term rewrite system $\mathcal{R}$ is confluent if the critical pair steps are relatively terminating with respect to $\mathcal{R}$. We further show how to encode the rule-labeling heuristic for decreasing diagrams as a satisfiability problem. Experimental data for both methods are presented.

Keywords Confluence · Decreasing diagrams · Relative termination · Term rewriting

1 Introduction

This article is concerned with automatically proving confluence of term rewrite systems. Unlike termination, for which the interest in automation gave and continues to give rise to new methods and tools, automated confluence analysis has received little attention. We present a new confluence criterion which is easy to implement on top of existing termination tools that support relative termination. The criterion states that a left-linear and locally confluent rewrite system is confluent if the rewrite steps that give rise to critical pairs are *relatively terminating* with respect to the given rewrite rules. This result can be viewed as a generalization of the two

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