Regional vs. Global Finite-State Error Repair

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Abstract. We focus on the domain of a regional least-cost strategy in
order to illustrate the viability of non-global repair models over finite-
state architectures. Our interest is justified by the difficulty, shared by
all repair proposals, to determine how far to validate. A short validation
may fail to gather sufficient information, and in a long one most of the
effort can be wasted. The goal is to prove that our approach can provide,
in practice, a performance and quality comparable to that attained by
global criteria, with a significant saving in time and space. To the best
of our knowledge, this is the first discussion of its kind.

1 Introduction

A classic problem in error repair is how far into the string to validate the process.
Given that it is not possible to ensure that the correction and the programmer’s
intention are the same, the goal is to find the least-cost one. This can only be
decided in the context of the entire input, and global methods [4,5] are not
necessarily the best option, due to their inefficiency, but are the most commonly
used and for this reason considered to be the most appropriate. An alternative
consists of examining the non-global context and attempting to validate repairs
by tentatively recognizing ahead, following a successful approach on context-free
grammars (CFGs) [7].

In this sense, although all proposals on error repair in the Chomsky’s
hierarchy are guided by some kind of linguistic data, whether grammar or
automaton-based, each level strongly conditions the strategy to follow. So,
requests on regular grammars (RGs) are different from those dealing with
CFGs [8], where parses are not usually performed in depth, but breadth-wise;
whilst the number of states in the associated push-down automaton is often
small in practice. Our proposal takes this into account by limiting the search
space associated to the repair. We explore the alternatives according to the
topology of the corresponding finite automaton (FA). This allows us to restrict

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