

A Practical Method for LR and LL Syntactic Error Diagnosis and Recovery

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This paper presents a powerful, practical, and essentially language-independent syntactic error diagnosis and recovery method that is applicable within the frameworks of LR and LL parsing. The method generally issues accurate diagnoses even where multiple errors occur within close proximity, yet seldom issues spurious error messages. It employs a new technique, parse action deferral, that allows the most appropriate recovery in cases where this would ordinarily be precluded by late detection of the error. The method is practical in that it does not impose substantial space or time overhead on the parsing of correct programs, and in that its time efficiency in processing an error allows for its incorporation in a production compiler. The method is language independent, but it does allow for tuning with respect to particular languages and implementations through the setting of language-specific parameters.

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Additional Key Words and Phrases: LL parser, LR parser, syntactic error diagnosis, syntactic error recovery, syntactic error repair

1. INTRODUCTION

This paper presents a powerful, practical, and essentially language-independent syntactic error recovery method that is applicable within the frameworks of LR and LL parsing. An error recovery method is powerful insofar as it accurately diagnoses and reports all syntactic errors without reporting errors that are not actually present. A successful recovery, then, has two components: (1) an accurate diagnosis of the error, and (2) a recovery action that modifies the text in such a way as to make possible the diagnosis of any errors occurring in its right context. An “accurate” diagnosis is one that results in a recovery action that effects the “correction” that a knowledgeable human reader would choose. This notion of accuracy agrees with our intuition but cannot be precisely defined. In some instances, of course, the nature of the error is ambiguous, but at the very least, the diagnosis and corresponding recovery should not result in an excessive

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