Elizabeth Scott Explained

Parsing from Earley Recognisers

Zoe Wheeler

University of Texas at Austin zoe.donnellon.wheeler@gmail.com

Walter Xia

University of Texas at Austin swilery@utexas.edu

Abstract

Earley's Algorithm is able to recognize general context-free grammars in $O(n^3)$, where n is the size of the string to be recognized. However, there are times in which we want more than just a yes or no answer. There are times in which we want an actual parse tree, and for ambiguous grammars, there are times in which we want all possible parse trees. Fortunately, there is a paper by Dr. Elizabeth Scott, [2], that presents a technique to produce a data structure known as a Shared Packed Parse Forest(SPPF), able to represent even an infinite number of parse trees. Unfortunately this paper is poorly written, making it very difficult to understand. Our paper is a re-explanation of Scott's techniques. It is agreed by many that Earley's Algorithm is also difficult to understand. Fortunately, there exists a data structure due to Dr. Gianfranco Bilardi and Dr. Keshav Pingali, [1], known as Grammar Flow Graphs(GFGs) that significantly ease the understanding of the algorithm by reformulating parsing problems as path problems in a graph. Our technique will use GFGs.

Categories and Subject Descriptors F.7.2 [Semantics and Reasoning]: Program Reasoning—Parsing

General Terms Context-Free Languages, Cubic Generalized Parsing, Earley Parsing

Keywords Earley Sets, Grammar Flow Graphs, Non-Deterministic Finite Automaton, Shared Packed Parse Forest

1. Introduction

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A. Appendix Title

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References

- [1] Gianfranco Bilardi, and Keshav Pingali. Parsing with Pictures. UTCS Tech Reports, 2012. This is a full TECHREPORT entry.
- [2] Elizabeth Scott. SPPF-Style Parsing From Earley Recognisers. *Electronic Notes in Theoretical Computer Science*, 203(53-67), 2008. This is a full ARTICLE entry.