

DEPARTMENT OF INFORMATICS

TECHNISCHE UNIVERSITÄT MÜNCHEN

Master's Thesis in Informatics

Formal Verification of an Earley Parser

Martin Rau

DEPARTMENT OF INFORMATICS

TECHNISCHE UNIVERSITÄT MÜNCHEN

Master's Thesis in Informatics

Formal Verification of an Earley Parser

Formale Verifikation eines Earley Parsers

Author:	Martin Rau
Supervisor:	Tobias Nipkow
Advisor:	Tobias Nipkow
Submission Date:	15.06.2023

I confirm that this master's thesis in informatics is my own work and I have documented all sources and material used.

Munich, 15.06.2023

Martin Rau

Acknowledgments

TODO: Acknowledgments

Abstract

TODO: Abstract

Contents

Acknowledgments	iii
Abstract	iv
1 Introduction	1
1.1 Motivation	1
1.2 Structure	1
1.3 Related Work	1
1.4 Contributions	1
1.5 Isabelle/HOL	1
2 Earley’s Algorithm	2
3 Fixpoint Recogniser	3
4 Earley Recogniser	4
5 Earley Parser	5
6 Examples	6
7 Conclusion	7
7.1 Summary	7
7.2 Future Work	7
8 Templates	8
8.1 Section	8
8.1.1 Subsection	8
List of Figures	10
List of Tables	11

1 Introduction

$$\llbracket P; Q \rrbracket \implies P \wedge Q$$

datatype *'a cfg* = CFG (*'a list*) (*'a list*) ((*'a* × *'a list*) *list*) *'a*

1.1 Motivation

some introduction about parsing, formal development of correct algorithms: an example based on earley's recogniser, the benefits of formal methods, LocalLexing and the Bachelor thesis.

1.2 Structure

standard blabla

1.3 Related Work

see folder and bibliography

1.4 Contributions

what did I do, what is new

1.5 Isabelle/HOL

take closest pair paper section and add additional notation as needed

2 Earley's Algorithm

illustrate with derivation rules and text, first only the recogniser then the parser

3 Fixpoint Recogniser

4 Earley Recogniser

5 Earley Parser

6 Examples

7 Conclusion

7.1 Summary

7.2 Future Work

8 Templates

8.1 Section

Citation test [**latex**].

8.1.1 Subsection

See [Table 8.1](#), [Figure 8.1](#), [Figure 8.2](#), [Figure 8.3](#).

Table 8.1: An example for a simple table.

A	B	C	D
1	2	1	2
2	3	2	3

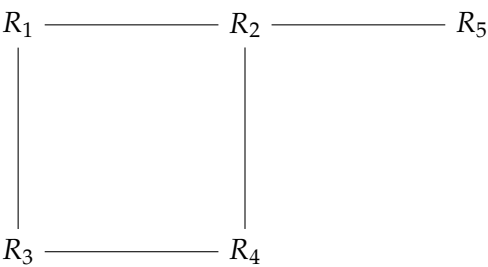


Figure 8.1: An example for a simple drawing.

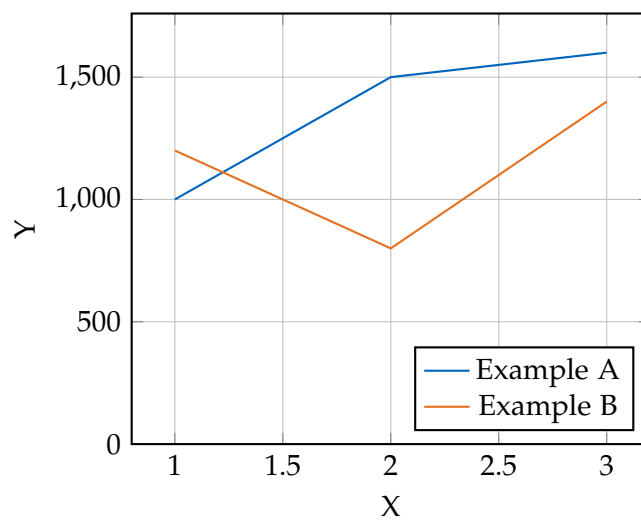


Figure 8.2: An example for a simple plot.

```
SELECT * FROM tbl WHERE tbl.str = "str"
```

Figure 8.3: An example for a source code listing.

List of Figures

8.1	Example drawing	8
8.2	Example plot	9
8.3	Example listing	9

List of Tables

8.1	Example table	8
-----	-------------------------	---