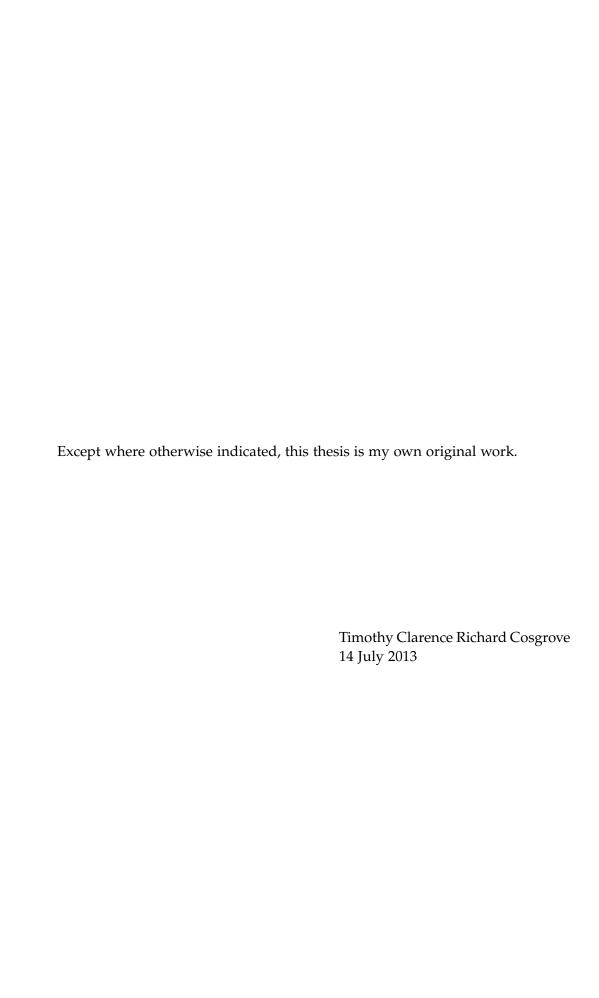
Term-Indexing for the Beagle Theorem Prover

Timothy Clarence Richard Cosgrove

A subthesis submitted in partial fulfillment of the degree of Bachelor of Science (Honours) at The Department of Computer Science Australian National University

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Acknowledgements

Thank you to my Supervisor and all...

Abstract

This should be the abstract to your thesis...

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An Introduction to My Thesis

- 1.1 The Basis for this Work
- 1.1.1 A Theoretical Framework

Background

2.1 First-Order Logic Terms and Notation

This thesis focuses around the extension of *beagle*, a *first-order logic* (FOL) theorem prover. In order to understand beagle's purpose and functions a basic understanding of the FOL logical system is required. This section provides a rudimentary overview of FOL syntax and uses; but also includes an explanation of any specialised terms and notation used throughout the paper.

2.1.1 FOL basics

2.1.2 Calculi and FOL problems

Should contain

- Variables
- Symbols
- Predicates
- Quantifiers
- Notion of soundness and completeness
- Description of a 'calculus'
- Positions

2.2 Automated Reasoning and Theorem Proving

Automated Reasoning is a rapidly growing field of research where computer programs are used to solve problems stated in first order logic statments or other formal logics.

[Weidenbach et al. 1999], [Riazanov and Voronkov 1999], [Schulz 2002] Should contain

Theorem prover examples

2.3 Term Indexing

Term indexing is a technique used to

2.4 Fingerprint Indexing

Fingerprint Indexing is a recent technique developed by Schulz [2012].

2.5 The Beagle Theorem Prover

The core implementation of Beagle was developed by Peter Baumgartner et al. of NICTA. Its purpose was to demonstrate the capabilities of the *Weak Abstraction with Heirachic Superposition Calculus*; which allows the incorporation of prior knowledge via a 'background reasoning' modules.

2.5.1 The Weak Abstraction with Heirachic Superposition Calculus

2.5.2 Beagle's Shortcomings

2.6 Scala

As mentioned above *beagle* is written in *Scala*, the Scalable Language. Scala is a functional language and may be confusing to those who are not familiar with the functional programming paradigm. This thesis will contain occasional snippets of Scala code; but note that any snippets used will be accompanied by an explanation and in general an understanding of Scala is not required.

We add a few blank pages here to illustrate section headings on odd pages (other than the first page in a new chapter).

Also, here is an example of a citation, and another . If in the context, it makes sense to talk about the work of an author in a more integrated way, like, that can be done too. Because the information on this page is *so* important, it has been indexed too (see the index at the back of this thesis).¹

¹However, it is *strongly* advisable to leave indexing until the thesis is complete. Donald Knuth says to allow about a day for the task of indexing. In my experience he was spot-on.

Implementing Fingerprint Indexing

3.1 Initial Implementation

```
/** Check two Fingerprint features for compatibility based
  * on the unification table (See page 6 of [Shulz 2012]).
  * This table is reduced to 4 cases:
   * True if Features are equal,
   * True if at least one Feature is B,
   * True if at least one Feature is A; but no Ns,
   * False otherwise */
def compareFeaturesForUnification
        (a:FPFeature, b:FPFeature) : Boolean =
   (a==b) ||
   (Set(a,b) match {
      case x if (x contains FPB) => true
      case x if (x contains FPA) => ! (x contains FPN)
      case _ => false})
```

Listing 1: Scala implementation of the Fingerprint unification table. [Schulz 2012, p6]

- 3.1.1 Refactoring Current Implementation
- 3.1.2 Initial Problems
- 3.2 Tailoring to Beagle

Results

- 4.1 Why I Did It
- 4.2 What I Did

8 Results

Conclusion

5.1 Why this is a Very Clever Thesis

10 Conclusion

Some Other Stuff

A.1 Why I Did It

More Stuff

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