Dynamic Semantic Resolution

Student: Yunshi Sun
u5783028
Supervisor: John Slaney
Overview

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Supervisor Profile

Professor John Slaney

Professor in the Research School of Computer Science, Australian National University

Instigator and convenor of the annual LOGIC SUMMER SCHOOL
What is “Resolution”?

It is a standard technique in automated theorem proving for sentences in propositional logic and first-order logic

\[ a \lor b, \quad \neg a \lor c \]

\[ \therefore b \lor c \]

Formally:

\[
\begin{array}{c}
\vdash a_1 \lor \cdots \lor a_{i-1} \lor c \lor a_{i+1} \lor \cdots \lor a_n, \\
\vdash b_1 \lor \cdots \lor b_{j-1} \lor \neg c \lor b_{j+1} \lor \cdots \lor b_m, \\
\vdash a_1 \lor \cdots \lor a_{i-1} \lor a_{i+1} \lor \cdots \lor a_n \lor b_1 \lor \cdots \lor b_{j-1} \lor b_{j+1} \lor \cdots \lor b_m
\end{array}
\]

\[
\therefore \quad a_1 \lor \cdots \lor a_{i-1} \lor a_{i+1} \lor \cdots \lor a_n \lor \neg c \lor b_{j-1} \lor b_{j+1} \lor \cdots \lor b_m
\]
Project Description

- What is “Semantic Resolution”?
  Semantic resolution uses the evaluation of the clauses within some model or interpretation to guide the search.

- What is “Dynamic Semantic Resolution”?
  In dynamic semantic resolution, the interpretation is updated during the search, so that it tends to fit the specific problem.
Project Goal

- A full implementation of dynamic semantic resolution within an existing high-performance theorem prover (prover9).

- Integration with instance-based reasoning by using a model elimination prover as the semantic component.
Project plan

Research
• Understand what is semantic resolution
• Comprehend the algorithm of dynamic resolution

Coding
• Understand the existing code
• Implement it basing on existing components

Testing
• Test the method against the standard TPTP benchmark sets and see how it performed

Review
• Project review and final report
Thank you!

Any Questions?