Master Thesis Proposal

Interpolation in First Order Logic with Equality

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1 Motivation and problem statement

After decades of continued research, the area of software verification still lacks effective procedures to determine invariants of loops, which are essential for reasoning about real world programs and proving their correctness. In the last years, the idea of applying Craig interpolation in order to calculate invariants enjoyed increasing popularity after successful applications, for instance in [?].

For practical applicabilty, often relatively weak formalisms such as propositional logic or equational logic with uninterpreted function symbols are employed. However for first-order logic with equality, no efficient algorithms for computing interpolants are known, even though a basic procedure is already provided in [?].

2 Aim of the work

3 Methodology and approach

4 State of the art

Theorem 1 (Interpolation). Let A and B be sets of first-order sentences such that $A \cup B$ is refutable. Then there exists an interpolant I such that

1. $A \supset I$ is valid
2. $I \wedge B$ is unsatisfiable
3. the non-logical symbols of I are only those that appear in both A and B.

5 Relation to Computational Intelligence

result is old but central to math logic