Project proposal

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1 Propositional dynamic logic solver

The idea of the project is to implement a solver for propositional dynamic logic (PDL). The input would be a formula in PDL and optionally a kripke structure for that formula. The output result is either *unsat*, *sat* or *unknown*. If a kripke structure is given, the result scope would be restricted to this kripke structure. Otherwise, the result scope would be all possible kripke structures.

2 Implementation

The project is primarily code and would use the SMT solver CVC4 as a back end and apply the relation theory to implement the semantics of PDL. The project would import CVC4 abstract syntax tree (AST) for relations from another project that I am working on (Alloy2SMT translator[1]) which supports type checking and SMT models parsing. For this project I would write a translator from PDL AST to CVC4 AST and display back the SMT models returned from CVC4 as Kripke structures and dot files for visualization using software like graphvis.

3 Progress so far

Since the imported CVC4 AST is written in Java, I have created a java project for PDL using gradle[2]. I have written an ANTLR4 grammar for PDL following the syntax in chapter 5 in [1]. Lastly I prepared classes for PDL AST for formulas and programs. Next task is to integrate all these together and finish the implementation.

4 Preferences for presentation day

I prefer April 30 for my presentation day.

References

[1] D. Harel, D. Kozen, and J. Tiuryn. *Dynamic Logic*. Foundations of computing. MIT Press, 2000.

[1] `https://github.com/CVC4/org.alloytools.alloy/tree/cvc4/alloy2smt`

[2] `https://github.com/mudathirmahgoub/pdl`