Internship Project Proposal

Developing a Robust SMT Solver by Understanding The Power of SAT Algorithms

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Project Description:  
A constraint satisfaction problem (CSP) involves finding values for variables subject to constraints on acceptable combinations of values, e.g., the eight queens problem which consists of trying to find a way to place eight queens on a chessboard so that no queen would attack any other queen. The AI search technique like depth first search (DFS) could be used to solve the simple 8-queens problem. Many real world problems can be cast as CSP. CSP itself plays an important role in artificial intelligence (AI).

The SAT problem is a special case of CSP where the variables take the Boolean value 0 or 1. The study of the SAT problem is essential because it is at the heart of many AI problems, including automatic deduction, bioinformatics, diagnosis, hardware/software verification, planning and scheduling.

The purpose of this project is to learn different SAT algorithms based on DPLL procedure or stochastic local search (SLS) and then develop a robust SMT solver by combining different power that SAT algorithms have.

This project would suit a student with efficient “C” programming skills, interest in artificial intelligence (constraint, reasoning and search). The student will benefit from the presence of other NICTA researchers and visitors with strong interests in constraints, search and logics.