

Logic Project 3: Propositional Resolution and Related Methods

Adrian Crăciun
`acraciun@info.uvt.ro`

December 11, 2013

The Aim of the Project

Given an arbitrary propositional formula (or a clause set corresponding to that formula), tell whether it is satisfiable or not, using resolution, Davis Putnam (DP), and/or Davis Putnam Logemann Loveland (DPLL), according to an option passed to the program.

Requirements

- Using the implementation, the user should be able to introduce a clause set corresponding to a formula:
 - in the ideal case, Project 2: Normal Form Transformation is completed, and it can be used to transform any formula into its CNF, then into its clause form;
 - files are preferred for the input, to allow the user prior preparation of the input,
 - other input methods (visual forms, etc.) are not restricted, but “live” console input is not encouraged (due to limitations);
- all the intermediate steps in the methods should be printed, i.e. a trace of the execution (proof) should be available to the user of the program;
- the program should return the answer “Satisfiable”, if the input clause set (formula) is satisfiable, and “Not Satisfiable”, otherwise.

Programming Language

C or Python strongly suggested. However, other languages will be allowed¹.

¹This should be discussed with me before the start of the project and properly motivated

Delivery of the Project

The project will be delivered in the following form:

1. A paper, describing the implementation, that should contain the following:
 - the statement of the problem,
 - user manual, i.e. how to use the program,
 - a description of the solution (structure of the program, functions, data structures),
 - an argument (proof) that the program is correct,
 - a test suite for the program, i.e. examples of inputs, including non-trivial ones,
 - test runs (e.g. screen captures, or algorithm printouts), with timing,
 - comparisons between resolution, DP, DPLL,
 - conclusions (whatever the author(s) experience was);
2. Annexes to this paper, containing:
 - the license of the program (see http://en.wikipedia.org/wiki/Software_licenses); also provide a reason for the choice of license,
 - the code of the program,
 - the installation manual for the program.

NOTE. The paper and annexes will be delivered in .pdf format, by email or made available online (preferred).

3. The program (source + executable) should be sent by email or made available online (preferred).
4. The program will be demonstrated at the University (arrangements to be discussed).

Working in Teams

Working in teams (max. 3 people) is allowed, and even encouraged. However, this should be a learning experience. Therefore, people with experience in programming are encouraged to team up with the people which are less familiar with this activity. At delivery, any of the team members should be able to answer any question connected to the project.