



INSTITUTO SUPERIOR TÉCNICO

Artificial Intelligence and Decision Systems (IASD)

Lab classes, 2014/2015

Assignment #3

Version 1.0 - November 21, 2014

A propositional logic reasoner based on the Resolution principle consists of the following key elements:

- a program to convert logical sentences in propositional logic into the clausal normal form (CNF).
- a resolution-based theorem prover for propositional logic, assuming a CNF knowledge base.

The goal of this lab assignment is to create, in Python, the second element (theorem prover) of the resolution-based propositional logic reasoner.

1 Theorem prover

Given a knowledge base KB of facts, and a sentence α to prove, the program should return¹ **True** or **False** depending on whether α can be proved given KB , *i.e.*, $KB \vdash \alpha$. The reasoner should use the **resolution** inference method and the **factoring** rules, together with the **unit preference** strategy.

Since all sentences have to be in CNF, you should use the CNF converter developed for assignment #2. If your converter is not functional, you can assume that the input is already in CNF. If that is the case it should be given as a list of disjunctions, where each one of them is a list of literals.

¹See next section for further details.

Program desirable features

Besides solving the main problem, *i.e.*, prove α from a KB , the program should:

- read the KB and the sentence α to prove from an input file;
- have an option to list the KB and α ;
- have an option to prove $KB \vdash \alpha$ explaining the inference process step by step;
- write everything in an output file.

The deliverable of this Lab Assignment consists of two components:

- the Python source code
- a short report with no more than 2 pages.

Deadline: 24h00 of 12-Dez-2014, by email to lmmc@isr.ist.utl.pt