

Strategy Selection in the Resolution Theory

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The essay would like to deal with some interesting questions of the Resolution Theory in the field of Artificial Intelligence. These issues and the relevant answers try to find solutions for some efficiency problems of the automated reasoning, with discussing and processing some parts of the resolution theory and some very related fields. The main goal is to construct an algorithm, which would be able to always advise a given method for reasoning a given formula such that approximately best performance would be reached. In the followings I will give you a short overview about this job.

To give you the reasons why to concentrate on these topics, we must assume that we (or our theorem prover) have to prove very long logical formulas. Of course, the length is determined by the huge number of (different) predicate and variable symbols occurring in the formula, rather than the length of the symbols. It is a well known fact, that unification problem and theorem prover algorithms are more and more long in time by increasing the number of predicates and variables, and that certain growth is greater than linear. But, however, the time largely depends on the chosen kind of resolution method and strategy, too. So it would be worth to find a linear or an approximately linear algorithm, which would find out the most efficient strategy and method for a given problem. Anyway, a prover software has to verify a given formula by all means in order to seek after its structure and to make a syntactical verification (so it has to "run over" on the formula once at least), and our investigations may be inserted into this processing.

Analyzing resolution methods and strategies ("methods") is a very important part of this job. Why? Because we have to find some certain distinctive features of the syntactical structure of logical formulas that make those big differences between the efficiency of the various kind of methods. Afterwards we have to trace the methods apiece in order to be able to determine what kinds of formulas are required for a given method to reach good efficiency. The centre of this part should be to find special and usable measurement units (e.g. the deviation of the length of the longest clause from the average length of clauses).

After deriving some measurement units and giving a short summarize of our results, we will have to build up an algorithm doing the previous analysis alone. The goal is to increase the efficiency of proving, so this algorithm must also be efficient. And, of course, would be adaptable into other logical systems.