SAT Solvers

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Submitted as part of the degree of BSc Computer Science to the

Board of Examiners in the School of Engineering and Computing Sciences, Durham University

Abstract —

Context/Background

The purpose of SAT Solvers is the solve the satisfiability problem, they are in use in modern day technologies for many practical reasons including: model checking, hardware verification, automatic test pattern generation, planning, scheduling, and even challenging problems from algebra. Over the years, we have seen new implementations of these SAT solvers which more importantly are becoming more efficient.

Aims

The aim of this project is to research modern day SAT solvers and understand the reasons to their efficiency, discovering different implementations and understanding their uses is therefore vital. Furthermore, another aim of this project and one in which concrete results can be produced is the implementation of a SAT Solver capable in solving more difficult satisfiability problems.

Method

Various SAT solvers should be researched, comparisons in their run times should be made and recorded. Implementation on different variations of SAT Solvers ranging from their complexity, understanding the underlying concepts of these implementations, taking into consideration the algorithm and data structures involved.

Proposed Solution.

Research variations of the SAT Competition solvers as a initial look into the various implementations, compare running time of these variations, taking into account search problem implementations and other solutions.
Using Python to create test implementations without consideration of advanced optimisations and then moving on to produce more optimised versions either using optimised frameworks or a more low level programming language such as C++.
Research modern technologies such as machine learning and how they may be used to produce more efficient solvers.

Keywords — SAT Solver, search problem, machine learning.

I INTRODUCTION

Project Overview

SAT Solvers come in many variations, this project is to understand the practical purpose of SAT Solvers, how SAT Solvers have developed over the years and how some variations are implemented. Concrete results can be gathered from comparing SAT solvers through their running times and use cases. Moreover, implementation of SAT Solvers of different variations including the use of more modern techniques will be made. Overall, this project will consider SAT Solvers from a theoretical view and implementations will be made from a theoretical approach on ideas from search problem and machine learning concepts.

This section briefly introduces the project, the research question you are addressing. Do not change the font sizes or line spacing in order to put in more text.

Note that the whole report, including the references, should not be longer than 12 pages in length (there is no penalty for short papers if the required content is included). There should be at least 5 referenced papers.

II DESIGN

This section presents the proposed solutions of the problems in detail. The design details should all be placed in this section. You may create a number of subsections, each focusing on one issue.

This section should be up to 8 pages in length. The rest of this section shows the formats of subsections as well as some general formatting information. You should also consult the Word template.

A Main Text

The font used for the main text should be Times New Roman (Times) and the font size should be 12. The first line of all paragraphs should be indented by 0.25in, except for the first paragraph of each section, subsection, subsubsection etc. (the paragraph immediately after the header) where no indentation is needed.

B Figures and Tables

In general, figures and tables should not appear before they are cited. Place figure captions below the figures; place table titles above the tables. If your figure has two parts, for example, include the labels "(a)" and "(b)" as part of the artwork. Please verify that figures and tables you mention in the text actually exist. make sure that all tables and figures are numbered as shown in Table 1 and Figure 1.

Table 1: UNITS FOR MAGNETIC PROPERTIES

Symbol	Quantity	Conversion from Gaussian

C References

The list of cited references should appear at the end of the report, ordered alphabetically by the surnames of the first authors. The default style for references cited in the main text is the Harvard (author, date) format. When citing a section in a book, please give the relevant page numbers, as in (**?**, p293). When citing, where there are either one or two authors, use the names, but if there are more than two, give the first one and use "et al." as in , except where this would be ambiguous, in which case use all author names.

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