Universitat Politècnica de Catalunya

Deliverable 1: Context and scope of the project

Design of an environment for solving pseudo-boolean optimization problems

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Author:
Marc Benedí

Director:
Dr. Jordi Cortadella

GEP

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Edinburgh, UK

UNIVERSITAT POLITÈCNICA DE CATALUNYA

Abstract

Facultat Informàtica de Barcelona
Department of Computer Science

Computer Science Degree

Deliverable 1: Context and scope of the project

by Marc BENEDÍ

In this deliverable, a first introduction into the project context1 will be made. *Boolean Satisfiability Problems* are explained together with other important concepts for this project like *Boolean Formula, Pseudo-Boolean Formula, Conjunctive Normal Form, Minimization, ...* The background for this project and motivations will also be detailed.

Next, the Project Formulation2 will be detailed, where the general objectives of it will be defined.

Later, the Scope3 of the project will be discussed together with what requirements the project should meet, how are they going to be made and what obstacles could be found.

Finally, the used methodology, the tools and the rigor will be exposed in Methodology and Rigor4.

Glossary

LAH List Abbreviations Here
WSF What (it) Stands For

Contents

Chapter 1

Introduction

en aquesta seccio es fara una primera introduccio al entorn del treball

1.1 Context

Explicar que es SAT, la logica, boolean formula, pseudo boolean, cnf , satsolvers, minimization
Target audience: logic researchers, planners etc...
Users: C++ programmers which works with logic and want to represent their formulas and improve their time
Beneficiaries:

Boolean satisfiability problems *(SAT from now on)* is the problem of finding a model[1] for a boolean formula. In other words, it is the result of evaluating the boolean formula after replacing its variables for *true* or *false*.
SAT is widely used in Computer Science because it was the first problem proved to be NP-Complete[1][2] which allowed a lot of NP[3] to be reduced to it.

1.1.1 What is a Pseudo-Boolean Formula?

In propositional logic, a boolean formula is defined as following[2]:
Let P be a set of predicate symbols like $p, q, r, ...$

- All predicate symbol of P is a formula.

- If F and G are formulae, then $(F \land G)$ and $(F \lor G)$ are formulae to.

- If F is a formula, then $(\neg F)$ is a formula.

- Nothing else is a formula.

This representation has some limitations because it can only express properties which are *true* or *false*.

1.2 Background

Explicar el traball d'investigacio fet aquest quadri

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[1]An interpretation which satisfies the formula.
[2]NP and NP-hard.
[3]Nondeterministic polynomial time.

1.3 Sate-of-art

Parlar d'alguns papers anteriors i discutirlos una mica per sobre

1.4 Motivation

Explicar el perque d'aquest treball

Chapter 2

Project Formulation

Explicar en que consisteix el projecte

2.1 General objectives

Explicar quins son els objectius generals del treball

Chapter 3

Scope

3.1 What and how?

Parlar del que es vol fer i com es fara
requirements the project should meet
what to do? meet the requirements established by the client in particular, and by the
rest of stakeholders

Chapter 4

Methodology and Rigor

explicar el perque es defineix una metodologia

4.1   Methodology

TDD i agile
short cicles
weekly scrum

4.2   Tools

In this chapter the development tools for this project will be introduced.

4.2.1   Git

Git is a well known version control system developed by Linus Torvalds[1].
Git will be used in this project because it allows to maintain a tracking of all the changes made (commits), and what is more important, return to them at any time. In addition to this, it enforces a short cycle development (because commits are small units of work) and the developer has to document them.

4.2.2   Trello

Trello is lala

4.2.3   Mendeley

4.2.4   CLion

4.3   Communication

4.4   Rigor and Validation

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[1]Linux creator. (more)

Bibliography

[1] Stephen A. Cook. "The complexity of theorem-proving procedures". In: *Proceedings of the third annual ACM symposium on Theory of computing - STOC '71*. New York, New York, USA: ACM Press, 1971, pp. 151–158. DOI: 10 . 1145 / 800157 . 805047. URL: http://portal.acm.org/citation.cfm?doid=800157. 805047.

[2] Rafael Farré et al. *Notas de Clase para IL - 2.Definición de la Lógica Proposicional*. Barcelona, 2009. URL: https://app.box.com/file/225148187559.