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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Definition of the scope of the project in the context of its study

for the course

GEP

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Chapter 1

Project Formulation

1.1 Introduction

There is an excellent introduction (context) that defines the terms and concepts of the subject under study. Stakeholders (target audience, users and beneficiaries) are fullyspecified.

There is an excellent literature review onthe subject under study: previous studies are cited, summarised and discussed. It is possible to identify the gap in the literature that this project addresses. Thus, this project is fully supported by the literature.

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 $(F \wedge G)$ and $(F \vee G)$ 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] An interpretation which satisfies the formula.
[2] NP and NP-hard.
[3] Nondeterministic polynomial time.

1.1.2 What is minimization?

1.2 The project

The objectives of the project are clear and well-specified. The proposed project is significant enough to be considered a TFG.

Chapter 2

Scope

The project of the scope is well defined. Possible obstacles that may hinder the execution of the project are clearly stated.

2.1 Possible obstacles and its solution

Chapter 3

Methodology and rigor

The document perfectly describes the methodology that will be followed. Tools to monitor the evolution of the project are clearly stated.

3.1 Development Tools

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

3.1.1 Version Control System: 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.

3.1.2 Ticket Management: Trello

Trello is lala

3.2 Validation Methods

[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.

[3] Rafel Farré et al. *Notas de Clase para IL - 4. Definición de Lógica de Primer Orden*. 2009. URL: https://app.box.com/file/225148226794.