

COMP4075/G54RFP Coursework Part III

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1 Project Overview

1.1 Motivation

The original basis for this project comes from a series of lab exercises from the G52AIM module, Artificial Intelligence Methods. The lab exercises involved implementing a variety of AI methods to solve some basic optimisation problems namely MAX-SAT problems.

Many of the methods implemented involved combining smaller functions together to create the desired effect. This could effectively translated into a functional programming setting. I thought it would be interesting to try and reimplement these some of these methods in Haskell to see the benefits of the FP paradigm to these AI methods.

1.2 Technical Background

1.2.1 MAX-SAT

MAX-SAT is an optimisation problem which is NP-Hard. Given a logic formula in conjunctive normal form, the aim is to maximise the number of clauses which are true. To do this variables in the formula must be given a boolean value so that the formula can be evaluated, giving a score based upon how many clauses are true.

1.2.2 Hill Climbing Algorithms

Hill Climbing algorithms efficiently explore the search space by incrementally change

1.2.3 Genetic Algorithms

1.3 Aims of the Project

The original coursework took place over several lab sessions, incorporating a variety of topics and theoretical questions, as well as originally relying heavily of a java based framework. Due to this only part of the lab exercises will be looked into and some parts of the java framework will have to be remade in Haskell.

Here is what I intend to create in this project:

- MAX-SAT problem generator
- Naive solvers
- Genetic Algorithm Solver
- MAX-SAT evaluator
- Hill Climbing solvers

2 What I did — Needs another name

Discussion of the implementation, justifying key decisions and highlighting and explaining particularly interesting aspects, illustrating with excerpts from the developed code where appropriate.

The MAX-SAT problems were generated by a framework given in the original courseworks, this was via a java file that could be imported.

3 Learnt stuff — Needs another name

A section reflecting upon what was learned from the project and your thoughts around the project topic from a real-world programming perspective.