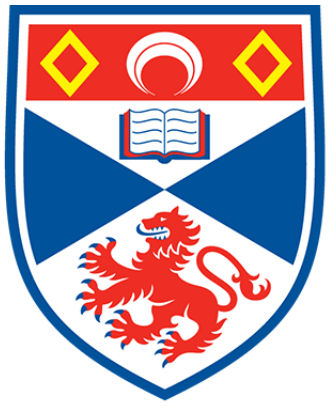

University of
St Andrews

CS4402 Constraint Programming

The Bombastic Modelling Problem

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1 Introduction

2 Design and Implementation

2.1 Initial states

There are three sets of state variables that need to be set up as the initial states: the avatar's position, the locations of the blocks and the cells of the grid.

```
$ Avatar's initial position
avatarCurrentRow[0] = avatarInitRow,
avatarCurrentCol[0] = avatarInitCol,

$ Initial locations for blocks
forall block : int(1..numBlocks) .
    blocksCurrentRow[0,block] = blocksInitRow[block] /\
    blocksCurrentCol[0,block] = blocksInitCol[block],

$ Initial cells of grid
forall row : int(1..r) .
    forall col : int(1..c) .
        gridCurrent[0,row,col] = gridInit[row,col],
```

2.2 Invalid states

Next are the constraints for invalid states of the game. This restricts the model to not have states such as having the avatar and a block be in the same position.

2.3 Movement

2.4 Grid

3 Results

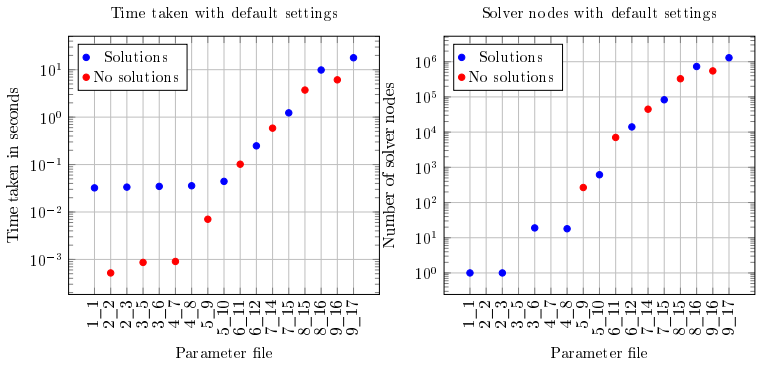

Figure 1: Time taken and number of solver nodes for all given parameters

3.1 Optimisations

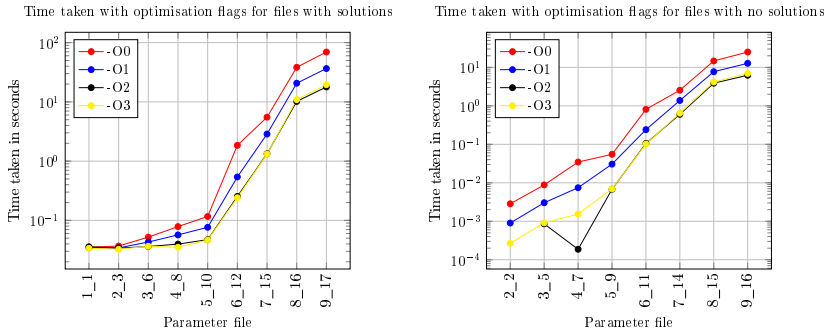

Figure 2: Results with different optimisation flags

3.2 Heuristics

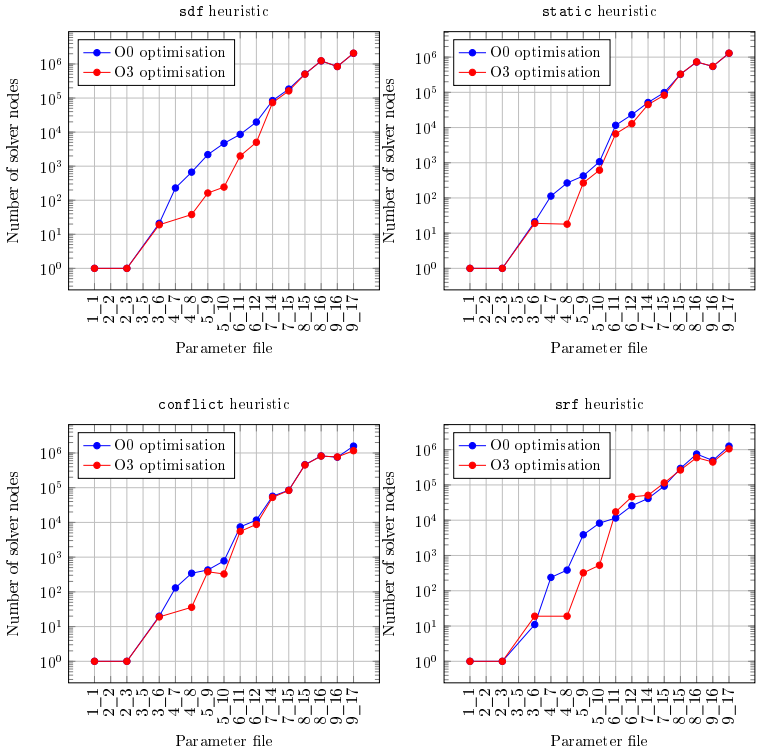

Figure 3: Number of solver nodes for different heuristics

3.3 Custom instances

4 Conclusion and evaluation