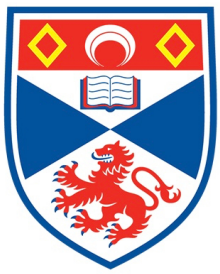

University of
St Andrews

DOER

Description, Objectives, Ethics and Resources

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1 Description

The main idea of the project is to implement a solver for a particular puzzle game. The game should be type of board game, which probably similar to the Sudoku or Chess. The solver of the game will be using its constraints. The possible language to be used for the solver is Essence Prime - constraint specification language. In case of successful implementation of the solver and guided system, which is trying to make solvable instances of the puzzle game, the project might be extended to the implementation of the game itself. Which could potentially be tested by the participants, who will be rating the difficulty of the game.

2 Objectives

2.1 Primary

(a) The main objective of the project is to automatically generate puzzles. The implemented software should be done based on the constraints of the game and solve any levels of the provided instances of the game. The instances should be provided by the text file.

(b) Write a system which can generate random instances of the puzzle, which are valid but may not have an answer. Use the system from (a) to check if these instances are solvable.

2.2 Secondary

(a) Write a guided system which generates instances of the puzzle, and tries to make solvable instances. This will recursively call the solver from part (a), and be guided towards correct and solvable instances.

(b) Implement the game itself, which will use the system from 2.2(a) and 2.1(a) to produce problems and check they are solvable.

2.3 Tertiary (Optional)

(a) Investigate how to generate harder levels, and both create and solve levels of the puzzle faster.

(b) Compare how the computer rates the difficulty of levels with how human players rate difficulty of levels.

3 Ethics

This project will not raise any significant ethical issues. The main issue is that participants will play a game generated by computer. We will explain to participants that the game may be impossible for human players, and allow them to stop at any time. The number of participants could be 25-30 students aged 18-25, and advertised with the university. Moreover, in order to obtain the needed information for the research it will only be needed to use the libraries, internet sources or unpublished data.

4 Resources

For the project development it should be enough to use lab machines with Linux operating system, using some IDEs or text editors. In case of the usage of the Essence Prime (constraint specification language) "Atom" text editor and "Savile Row" modelling assistant should be sufficient. Depending on what type of the puzzle game will be chosen the and whether there would be enough time for implementation of the game the languages and the system will be chosen.

For the management of the project, there could be used the following helpful tools: "Trello" (web-based project management application), "Mercurial"/"GitHub" version control, and "Mendeley" (program for managing research papers).

5 References

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