

Introduction

Your task is to model a problems in PDDL and solve them using a planner. For modelling the problem, two files must be provided: a domain file and a problem file. Once you have modelled the problem, you can solve it by using one of the state-of the art planners that already exist. You can either install Fast Downward (<http://www.fast-downward.org/>), or use the online editor (<http://editor.planning.domains/>).

You will present your solution on the next Lecture.

Exercise 1 Free Modelling (Recommended)

Model another problem of your choice!¹ It is likely that some sub-problem in your current (or perhaps some past) semester project, can be modelled and solved using a planner. Feel free to use this opportunity to try out how this technology can help and feel free to ask for advice and/or feedback on how to do that. To find suitable problems of your interest, you may think of cases where the solution can be expressed as a sequence of steps. Perhaps you may also look at lists of NP/PSPACE problems to find some inspiration.

Exercise 2 : Light Up (Alternative)

In this exercise, your task it to model the *Light Up* puzzle² in PDDL. This game is based on a 2D grid consisting of black and white cells. White cells can be lit up by placing light bulbs on the grid. Placing a light bulb at some coordinate $\langle x, y \rangle$ lights up all white cells of the same column (x), and all white cells of the same row (y), such that no black cells lies in between $\langle x, y \rangle$ and the cell, i.e., light propagation is stopped by black cells. A light bulb may only be placed in a cell that is not lighted up by another light bulb, yet. Some black cells are associated with numbers. This number gives the number of light bulbs that must be placed directly (horizontally or vertically) adjacent to the black cell. For example, if the number is 0, no light bulb may be placed in a cell adjacent to the black cell. If 1, exactly one light bulb may (and must) be placed to a cell adjacent to the black cell. The goal is to light up all white cells while adhering to the aforementioned constraints.

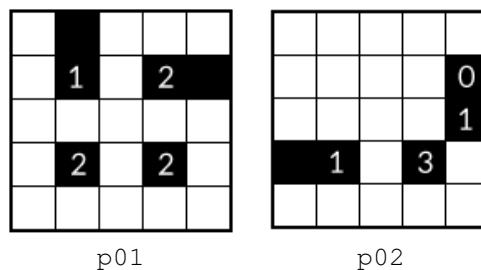


Figure 1: Two Light Up instances. The upper left corner has coordinate $\langle 0, 0 \rangle$. The bottom right is $\langle 4, 4 \rangle$.

Write a PDDL domain file that can be used for any instance of the puzzle. Encode the two Light Up instances in Figure 1 into two PDDL problem files.

¹We are often in need of new domains, so if you do this, please consider to submit your solutions and let me know if you'd be willing to make them publicly available for research purposes.

²[https://en.wikipedia.org/wiki/Light_Up_\(puzzle\)](https://en.wikipedia.org/wiki/Light_Up_(puzzle))