Informatics 2D Tutorial 6
PDDL, State-Space Search and Partial-Order Planning

Week 7

Task Description

You ask your personal robotic assistant to make you some tea. Your robot then needs to find a sensible plan that satisfies your request.

Part 1: Representing the World using PDDL

Use the Planning Domain Definition Language (PDDL) to represent your world.

1. You will first need to define the predicates that will then be used to describe the states in your world. You can define atemporal predicates that describe objects. Atemporal predicates do not change with the execution of actions. You can also define fluent predicates that can change with the execution of actions. To make tea you will need:

   - Water that can be either hot or cold (not hot), and can be in a bottle, kettle or a cup.
   - A kettle that can be empty or not empty.
   - A cup that can be empty or not empty.
   - A bottle that can be empty or not empty.
   - A tea bag that can either be in the cup or not in the cup.

2. Define an initial state where the tea bag is not in the cup, cold water is in the bottle, and all of the other containers are empty.

3. Formally describe the goal state of the plan. In this case the goal is to have tea (a cup full of hot water with a tea bag in it).

4. Define the following actions in terms of the *preconditions* that must hold prior to taking the action, and the *effects* that describe the changes made to the world after executing the action:

- Pour: An action that allows you to pour water from one container to another.
- AddTeaBag: An action that allows you to place a tea bag into the cup.
- BoilWaterInKettle: An action that allows you to use the kettle to boil the water.

Part 2: Partial-Order Planning

Create a partial-order plan that takes you from the initial state to the goal state. Show which actions depend on one another and which actions do not. What is the advantage of partial-order planning over state-space search?