Planning with concurrency

Memorandum of Practice

For each of the three parts of practice 1 it will be necessary to write a brief report discussing the results of each exercise. There is no minimum or maximum number of pages for the report, it simply must explain the results requested in a clear and understandable way. Some of the planners' output can be included if it helps explain the results, as well as tables when they can help synthesize and compare the results of different tests. The report must be delivered in PDF. In each exercise it will be indicated what should be explained in the report.

Exercise 3.1: Concurrent actions in emergency management

This exercise considers the implications of using concurrency in the emergency management domain that we have developed in the previous parts of the practice. For example, it can be assumed that a single drone will not be able to perform two actions at the same time, such as picking up two boxes at once, or picking up a box at the same time as it flies to its destination.

In this exercise you must think about what actions two drones should not be able to execute in parallel. A reasonable example is that two drones cannot pick up the same box at the same time. In a similar way, it is possible to reason about other actions that would not make sense for two drones to carry out in parallel, as well as others that could be debatable, and that you will have to determine as you consider, such as, for example, whether to be able to give two boxes in parallel to the same person. Decide which actions can be performed in parallel and specify it in memory.

Exercise 3.2: Implementation and concurrency testing

In this exercise you must extend the emergency management domain to add the possibility of creating concurrent plans using "durative actions".

To do this, you must eliminate the cost of actions in the domain and replace it with durative actions. The duration of these actions will still depend on the "fly-cost" function, so you should not eliminate it. Once the conversion is done, add several drones and transporters to the problems that you have generated for part 2 and verify that concurrent plans are generated that meet the conditions that you have defined in exercise 3.1. Use the OPTIC planner for this purpose.

Finally, investigate what size problem the OPTIC planner can solve in a maximum of 1 minute. Regarding the largest problem solved in that time, investigate how the variation of the different parameters of the problem individually (drones, boxes, people) affects the planner's performance.