

Multiagent Systems

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Exercise Sheet 5

Due: Friday, June 6, 2pm

Important: Each exercise sheet is to be solved in groups of **two students**. Thus, please note your names on each solution sheet and, if applicable, in the source code (as a comment on top of each source file).

After SVN-accounts have been created for you, the solutions are to be handed in as pdf or plain text files (UTF-8 encoded). We strongly suggest the use of $\text{\LaTeX}$ for typesetting your solutions.

You might complete your solutions in English or German.

Hint: The API documentation in `<jason path>/doc/index.html` will be very helpful to solve these exercises!

Exercise 5.1 (Jason, Warehouse Robots; 6 points)

Congratulations! You are the proud owner of 5 brand new robots and a warehouse full of crates. The previous owner of the warehouse left it in complete disarray, so it is up to your robots to organize the crates into something resembling order and turn it into a successful business.

Each robot is equipped with omni-wheels and thus can drive in all four directions. They can pickup crates on adjacent grid cells with their manipulators, then carry them to some other location and even build stacks of up to five crates. All robots are equipped with the newest sensor technology allowing them to receive sensor data from all four adjacent grid cells. So it is easy to distinguish, whether a field is free, is a wall, contains a stack of crates or is occupied by another robot. The robots have also pressure sensors equipped telling them if they carry a crate at the moment.

Unfortunately your budget proved insufficient to acquire state of the art Multi-Agent management software. But that should not be much of a problem... right?

In your svn directory you will find the warehouse-robots project. There you will find Java files for the warehouse environment. A simple robot agent with sample code for percepts and actions is also available.

For this week your task is to teach your robots how to tidy up your warehouse. The actual agent organization is up to you, as long as all crates end up in neat stacks of five.

Exercise 5.2 (Theory, Multi-Agent Path Planning; 4 points)

In previous exercises your agents were moving towards a target without any path planning. This is usually called reactive navigation. Can you think of situations, where this approach would fail?

The A* search algorithm is usually employed to solve path planning tasks in complex environments. Normally a path is constructed from a start position to a goal position. What would be the result, if the search is initialized from five positions at the same time (by pushing them all into the open queue)? Which two points would the resulting path connect?