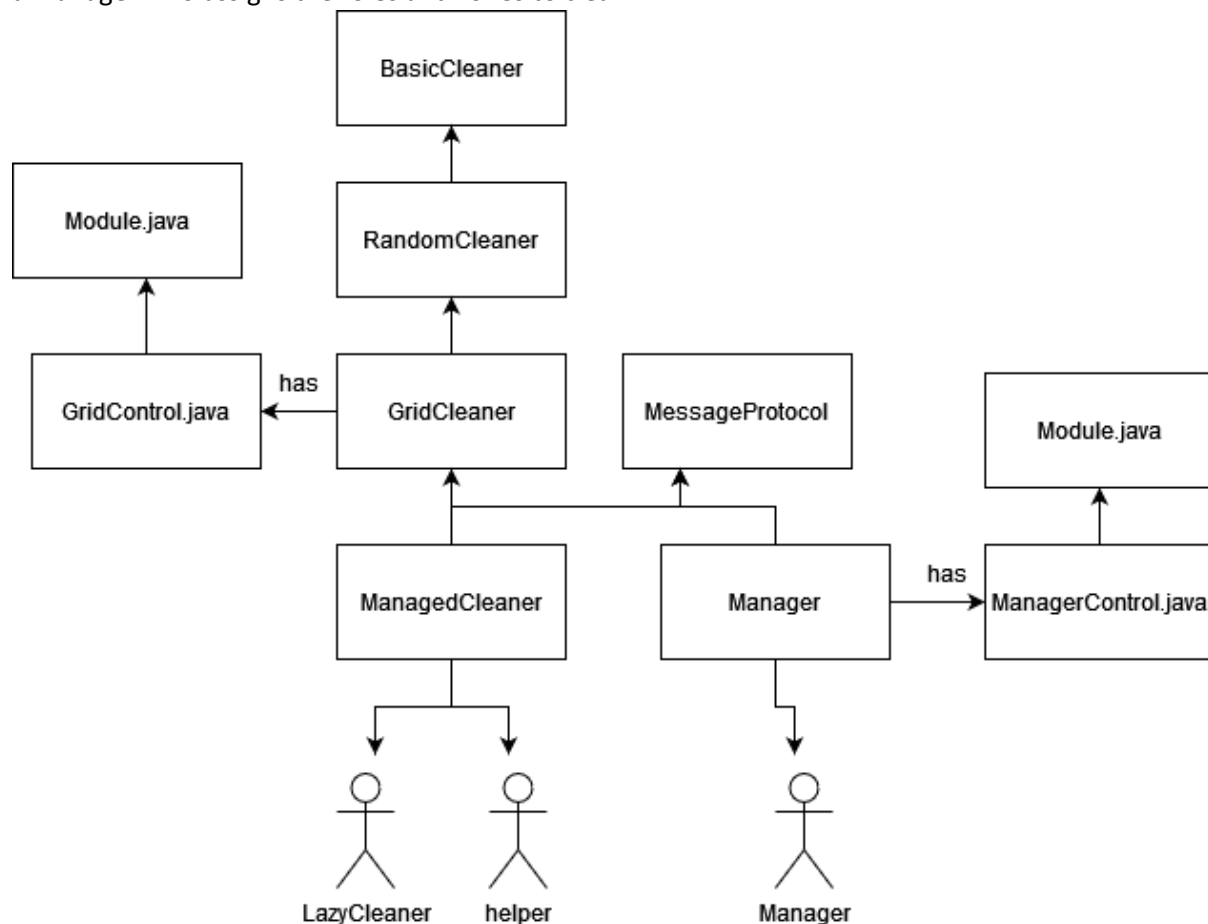


VacWord, LazyCleaner and Helper

Jose Retmal

Basically, this is a combination of the zone cleaning with the dust spotter. The LazyCleaner is the spotter who uses a balanced walk to move around a designed zone and will only clean what comes in his way, it will communicate all the dust that he spots to the helper to clean it for him. They have a manager who assigns the roles and zones to clean.



The BasicCleaner interact with the environment using `ei.event`, for each state of the environment a belief is created. It moves step by step, a new step happens when an action is completed and the environment perceptions for `square(left,forwardLeft, forward,forwardRight, right)` are updated. Always clean the "here" locations if have dust, it moves forward until an obstacle is reached.

The RandomCleaner Choose a random action from "move(left)", "move(forward)" and "move(right)" actions. Always clean the dust on the spot. If there is dust on the left, right or forward do not perform the random action it moves to the spot with dust and cleans it.

RandomCleaners were able to clean the entire grid in an average time of about 8 minutes.

The GridCleaner, can move using two different approaches: balanced walk(not fully balanced with wights randoms at the final decision or where to go) and shortest-path(implemented using flood-fill and is not fully working because it does not consider the direction).

Balanced walk will move forward if the is dust.

Shortest-path will move left, forward or right if there is dust(same as Randomcleaner), which means it ignores the shortest path in this situation. A new shortest-path is calculated after each movement.

Using four agents with a balanced walk the grid was cleaned in an average time of about 3 minutes.

ManagedCleaner can communicate with the manager which will assign the roles LazyCleaner or helper.

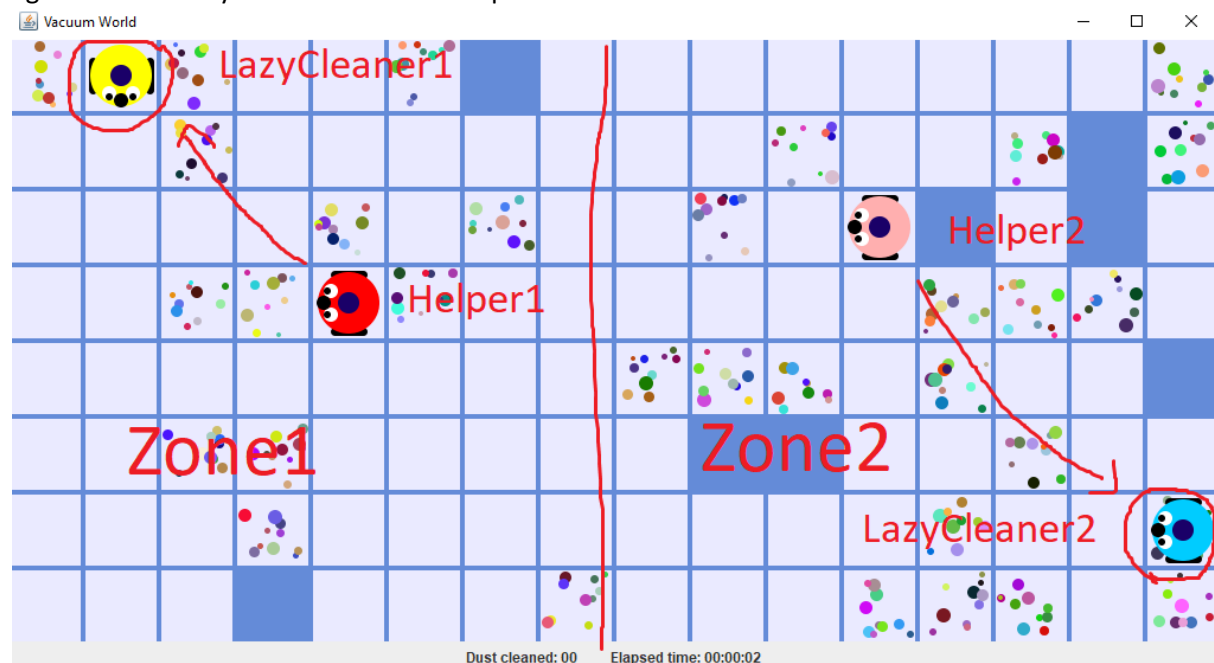
LazyCleaner, there are two lazy cleaners with the following characteristics:

- Use Balanced-walk.
- They do zone cleaning, half of the grid is assigned to each, this is implemented by adding steps to the balances walk count.
- Communicate all spotted dust to the helper

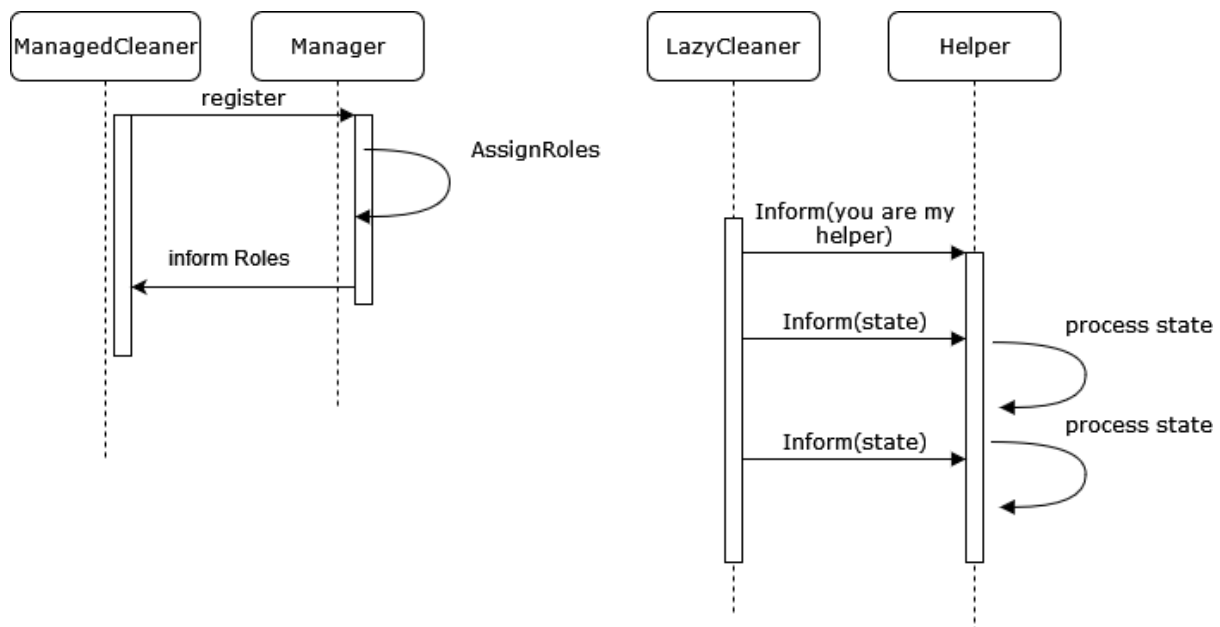
Helper, one helper for each LazyCleaner, with the following characteristic:

- Uses shortest-path to move to the spots with dust that are communicated by the LazyCleaner, spots are queued as beliefs.
- If no spots to clean are in the beliefs it will do random movements.

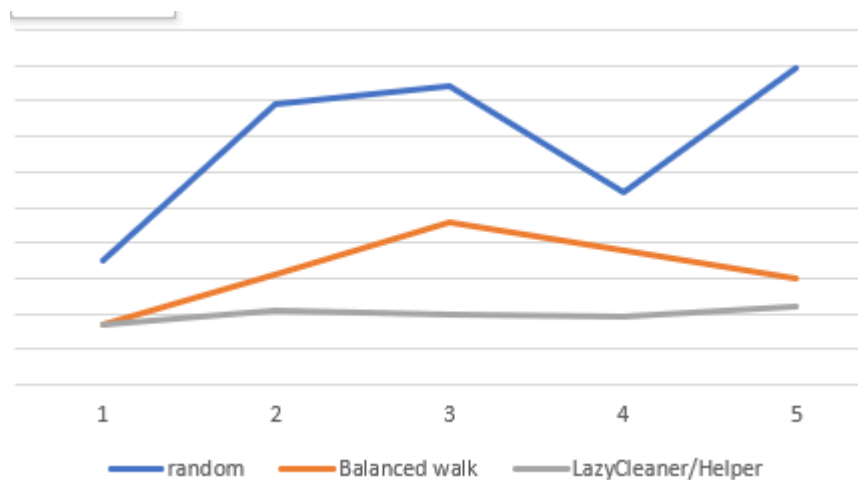
The Manager decides the roles of each agent. The two mora fare from each other agents will be the LazyCleaners and the side of the grid that is closest to him will be assigned to him. Then the closes agent to each LazyCleaner will be his helper.



The communication, first the managed agent register with the Manager, which then replies to the LazyCleaners with his helper and the zone they should clean. Then the LazyCleaner inform his helper and then send updates on each step.



Experiments, three approaches: random(all random moves), balanced-walk(all with balanced-walk), and the LazyCleaner-Helper. All three approaches were able to clean the grid with the LazyCleaner-Helper giving slightly the best finishing time.



Possible Improvements

- In a bigger map with more agents there could be more splits of the map. This could be done by applying the same process recursively.
- The agents could share the map, this could be done by the manager.
- Use flood-fill to identify areas of the zone that have been not visited, the LazyHelper could do this and then tell the helper to go and check that area.