

# Lab 1

## 1. Characterise the environment.

- a. The environment is partially observable as the agent can only see the tile that it's currently on and only knows about walls by bumping into them.
- b. Deterministic, the agent knows what results each action will return
- c. Sequential, once the agent has cleaned something it stays cleaned so the moves do matter also it matters where the agent moves since it has to return back home once finished.
- d. Static
- e. Discrete
- f. Single-agent

## 2. Develop a strategy for the agent such that it fulfills the goal and describe this strategy in a few sentences

- a. The agent needs to clean all dirty tiles and then return back home. The strategy that it will use to achieve this will be split into states. The first state will be to turn on, the second one to find the first wall by going forward until it finds a bump. The third state will be to find a corner by turning right and going forward until a bump is found. The fourth state will be the cleaning state where the agent will zig-zag through the whole area cleaning any dirt it finds, this state will be split into two left and two right states as first it will go forward until it bumps into a wall and then turns once right, switches to a turn state goes forward then turns again right, switches to the left state and goes forward until it bumps into a wall and then turns left, switches to a turn state

goes forward, turns left and switches to the right state. Rince and repeat these states until either hits a bump during the turn state (hitting another corner). During all states it shall keep track off how far it has gone on the y and x axis (These will be relative from the perspective of the agent) this is so it will be able to essentially go until both axis are at 0 and end up at the starting point which is the final state.

3. Code

included

4. Test your program with all three provided environments. Test with environments with random in their name can give slightly different results each time, so they should be repeated several times. Record the number of steps it takes to finish each environment.

Name	Steps	Time start	Time finish	Time elapsed
vacuumcleaner.gdl	60	17:53:00.970	17:53:31	31 sec

Name	Steps	Time start	Time finish	Time elapsed
Random	61	18:00:35	18:01:07	32 sec
-  -	61	18:02:23	18:02:54	29 sec
-  -	60	18:03:40	18:04:11	31 sec
-  -	60	18:05:12	18:05:43	29 sec

Name	Steps	Time start	Time finish	Time elapsed
RandomBig	161	18:06:39	18:08:02	83 sec
-  -	157	18:19:55	18:21:17	82 sec
-  -	159	18:14:52	18:16:15	83 sec
-  -	159	18:16:49	18:18:12	83 sec

6. Is your agent rational? Justify your answer.

A. We'd like to say that our agent is not rational because one of its performance measures is the amount of moves used to finish the challenge. Our agent fails in at least two ways when it comes down to that; it both uses a zig zag pattern to make sure it visits all tiles which is not very action efficient pattern compared to something like spiral one. It also bumps into walls frequently using up a "go" action when it could note down where the walls are and reduce the frequency of these "wasted" actions. Also another problem is that it revisits tiles it has been to before which could be circumvented, we are just not sure how that would be implemented efficiently. Now with all that out of the way I believe that with the aforementioned optimization the agent would be considered rational as it would do the actions which would maximise its performance measure.