

# CS4023D Artificial Intelligence

## Assignment 1

[Github Repo](#)

## Answer 1

After running 2 simulations for 1000 timesteps each, these are the results for all possible combinations.

```
Qn1 > VacuumBot.py > bot > _init_ > position
62 def main():
63     # Iterates through all possible combinations
64     for startPosition in range(2):
65         for A in range(2):
66             for B in range(2):
67                 Bot = bot(startPosition, [A, B], False)
68                 Bot.runSimulation()
69                 print()
70
71
72 if __name__ == '__main__':
73     main()
```

PROBLEMS OUTPUT TERMINAL DEBUG CONSOLE

> Qn1 main\* python VacuumBot.py  
Environment [A:Clean, B:Clean]  
Start Position: 0  
Performance Score: 0  
  
Environment [A:Clean, B:Dirty]  
Start Position: 0  
Performance Score: 1  
  
Environment [A:Dirty, B:Clean]  
Start Position: 0  
Performance Score: 1  
  
Environment [A:Dirty, B:Dirty]  
Start Position: 0  
Performance Score: 2  
  
Environment [A:Clean, B:Clean]  
Start Position: 1  
Performance Score: 0  
  
Environment [A:Clean, B:Dirty]  
Start Position: 1  
Performance Score: 1  
  
Environment [A:Dirty, B:Clean]  
Start Position: 1  
Performance Score: 1  
  
Environment [A:Dirty, B:Dirty]  
Start Position: 1  
Performance Score: 2  
  
> Qn1 main\* |

Simulation 1

> Qn1 main\* python VacuumBot.py  
Environment [A:Clean, B:Clean]  
Start Position: 0  
Performance Score: 0  
  
Environment [A:Clean, B:Dirty]  
Start Position: 0  
Performance Score: 1  
  
Environment [A:Dirty, B:Clean]  
Start Position: 0  
Performance Score: 1  
  
Environment [A:Dirty, B:Dirty]  
Start Position: 0  
Performance Score: 2  
  
Environment [A:Clean, B:Clean]  
Start Position: 1  
Performance Score: 0  
  
Environment [A:Clean, B:Dirty]  
Start Position: 1  
Performance Score: 1  
  
Environment [A:Dirty, B:Clean]  
Start Position: 1  
Performance Score: 1  
  
Environment [A:Dirty, B:Dirty]  
Start Position: 1  
Performance Score: 2  
  
> Qn1 main\* |

Simulation 2

## State Space Search Graph

Assumptions

- The performance measure awards one point for each clean square at each time step, over a "lifetime" of 1000 time steps.
- The "topography" of the environment is known *a priori* (Figure 2.2) but the dirt distribution and the initial location of the agent are not. Clean squares stay clean and sucking cleans the current square. The *Left* and *Right* actions move the agent left and right except when this would take the agent outside the environment, in which case the agent remains where it is.
- The only available actions are *Left*, *Right*, and *Suck*.
- The agent correctly perceives its location and whether that location contains dirt.

## Answer 2

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