MDL Assignment 3 Part 2

Report

Coordinate System Used

(0,0)	(0,1)	(0,2)	(0,3)
(1,0)	(1,1)	(1,2)	(1,3)

Answer 1:

Target at (1, 0) and o6 was observed
The belief states with non zero probability with their respective probability are:

```
Format: (position_agent, position_target, call)
((0, 1), (1, 0), 0) : 0.1
((0, 1), (1, 0), 1) : 0.1
((0, 2), (1, 0), 0) : 0.1
((0, 2), (1, 0), 1) : 0.1
((0, 3), (1, 0), 0) : 0.1
((0, 3), (1, 0), 1) : 0.1
((1, 2), (1, 0), 0) : 0.1
((1, 2), (1, 0), 1) : 0.1
((1, 3), (1, 0), 0) : 0.1
((1, 3), (1, 0), 1) : 0.1
```

The rest states have zero probability.

Answer 2:

Agent at (1, 1) and call was off and o6 was not observed
The belief states with non zero probability with their respective probability are:

```
Format: (position_agent, position_target, call)
((1, 1), (0, 1), 0) : 0.25
((1, 1), (1, 0), 0) : 0.25
((1, 1), (1, 1), 0) : 0.25
((1, 1), (1, 2), 0) : 0.25
```

The rest states have zero probability.

Answer 3:

The expected utility found using the SARSOP solver was:

For Q1 : 13.6567
For Q2 : 26.3701

Answer 4:

If the agent was at (0, 0) with probability 0.4

A	T	T	*
*	T	T	*

Probability for Observation o1 : 0
Probability for Observation o2 : 0.25 (Target at (0,1))
Probability for Observation o3 : 0
Probability for Observation o4 : 0
Probability for Observation o5 : 0
Probability for Observation o6 : 0.75 (Target at (0,2), (1,1), (1,2))

If the agent was at (1, 3) with probability 0.6

*	T	T	*
*	T	T	A

Probability for Observation o1 : 0
Probability for Observation o2 : 0
Probability for Observation o3 : 0
Probability for Observation o4 : 0.25 (Target at (1,2))
Probability for Observation o5 : 0
Probability for Observation o6 : 0.75 (Target at (0,1), (1,1), (0,2))

Combined Probability

The probability for each observation is

Probability for Observation o1 : 0 + 0 = 0
Probability for Observation o2 : 0.25 * 0.4 + 0 = 0.1
Probability for Observation o3 : 0 + 0 = 0

Probability for Observation o4 : 0 + 0.25* 0.6 = 0.15
Probability for Observation o5 : 0 + 0 = 0
Probability for Observation o6 : 0.75 * 0.4 + 0.75 * 0.6 = 0.75

The most likely observation to observe is **o6** with probability 0.75 since it has the highest probability. This was expected as there are more cells out of the one neighbourhood of Agent in both cases.

Answer 5:

The formula is given by

$Number\ of\ trees\ =\ a^{n}\ where\ \ a\ represents\ the\ number\ of\ actions$

$n\ =\ (o^{t}\ -\ 1)\ /\ (\ t\ -\ 1)\ where\ o\ is\ the\ number\ of\ observations\ and\ t\ is\ the\ depth\ of\ tree\ (time\ hori$

Here , o = 6 , a = 5
We considered simulation of length 100, so t = 100

Number of trees = 5^{n}
n = $(6^{100}$ - 1) / 99