AU332 Quiz16

* 基本信息：

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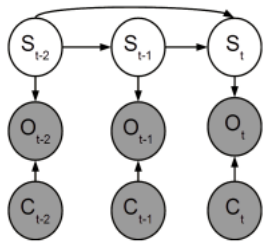

Dynamics model:

$P(S_t|S_{t-1}, S_{t-2}) = F(D_1, D_2)$
$D_1 = |S_t - S_{t-1}|$
$D_2 = |S_t - S_{t-2}|$

D_1	D_2	F(D_1, D_2)
0	0	0.7
0	1	0.2
0	2	0
1	0	0.3
1	1	0.3
1	2	0.5

Observation model:

$P(O_t|S_t, C_t) = E(C_t, D)$
$D = |O_t - S_t|$

C	D	E(C, D)
+	0	0.4
+	1	0.2
+	2	0.1
-	0	0.6
-	1	0.2
-	2	0

Pacman is trying to hunt a ghost in an infinite hallway with positions labeled as in the picture above. He's become more technologically savvy, and decided to locate find the ghosts actual position, $\mathbf{S_t}$, using some sensors he set up. From the sensors, Pacman can find, at each time step, a noisy reading of the ghost's location, $\mathbf{O_t}$. However, just as Pacman has gained technology, so has the ghost. It is able to cloak itself at each time step, given by $\mathbf{C_t}$, adding extra noise to Pacman's sensor readings.

Pacman has generated an error model, given in the table above, for the sensor depending on whether the ghost is cloaked or not.

Pacman has also generated a dynamics model, given in the table below, that takes into account the position of the ghost at the two previous timesteps.

***1. Assume that you currently have the following two particles: (S_6 = 7, S_7 = 8) and (S_6 = 6, S_7 = 6). Compute the weights for each particle given the observations C_6 = +, C_7 = -, O_6 = 5, O_7 = 8:**

(S_6 = 7, S_7 = 8)： 0.1 × 0.6 = 0.06

(S_6 = 6, S_7 = 6)： 0.2 × 0 = 0

***2. Assume that Pacman can no longer see whether the ghost is cloaked or not, but assumes that it will be cloaked at each timestep with probability 0.5. Compute the weights for each particle given the observations O_6 = 5, O_7 = 8:**

(S_6 = 7, S_7 = 8)： 0.05 × 0.5 = 0.025

(S_6 = 6, S_7 = 6)： 0.2 × 0.05 = 0.01

***3. To prevent error propagation, assume that after weighting the particles and resampling, one of the particles you end up with is (S_6 = 6, S_7 = 7).**

(i) What is the probability that after passing this particle through the dynamics model it becomes (S_7 = 6, S_8 = 6)?： 0

(ii) What is the probability the particle becomes ($S_7 = 7$, $S_8 = 8$)?： 0.5

提交