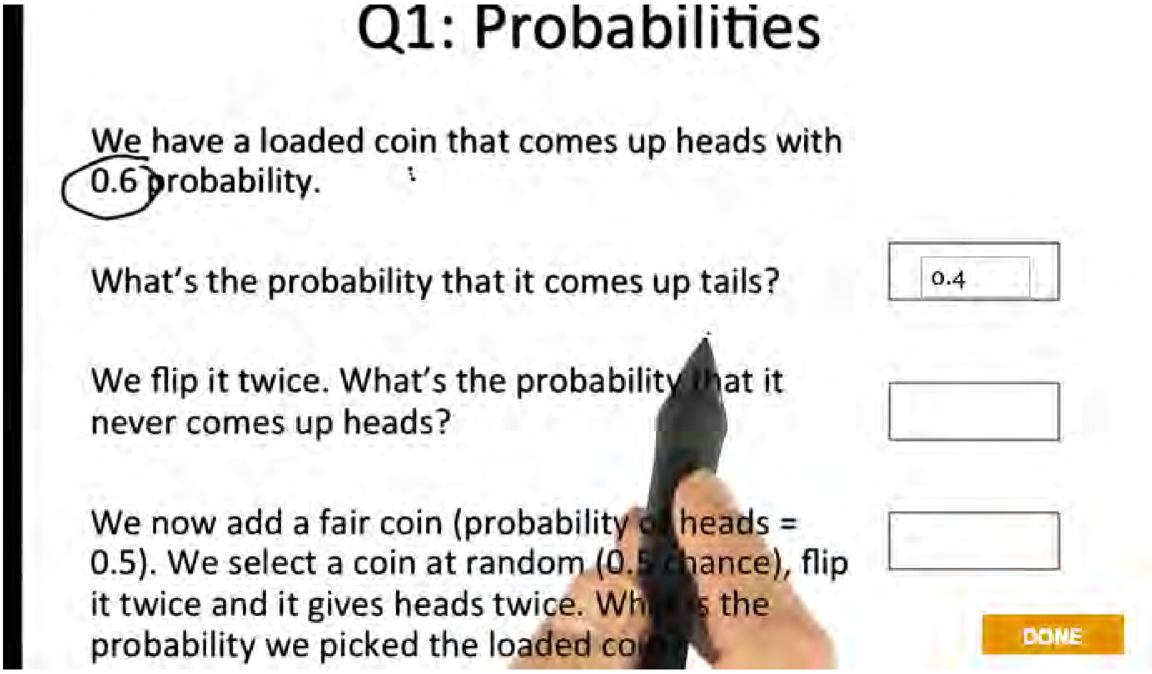
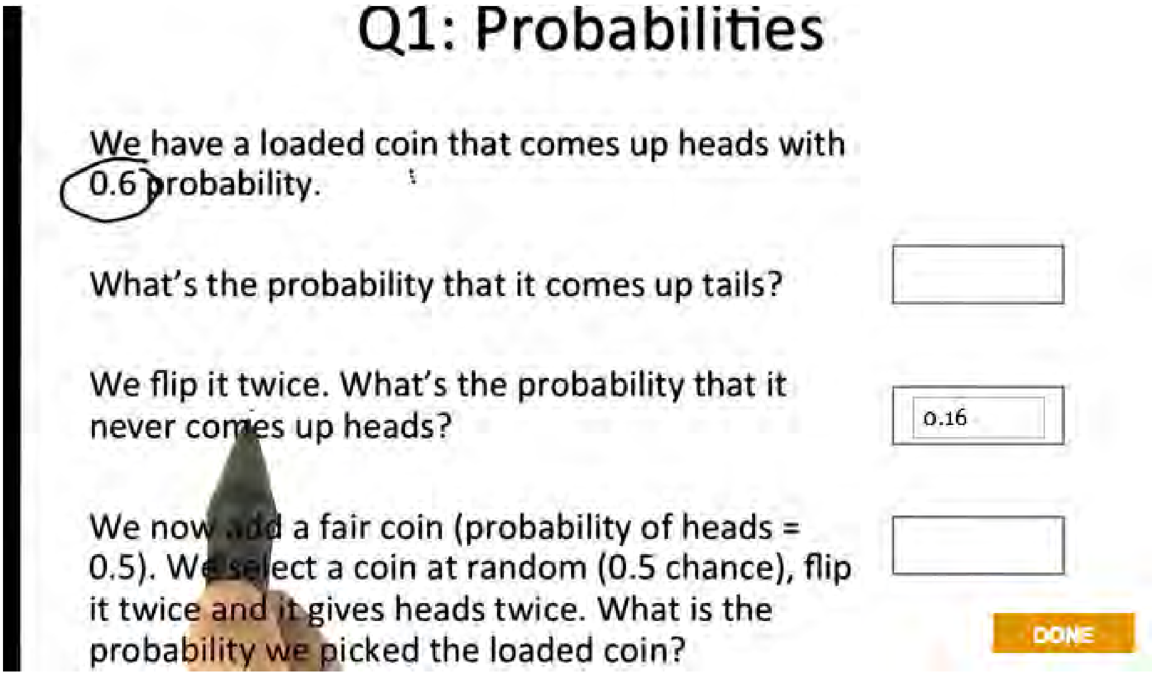
Answers

Mittwoch, 04. April 2012
14:50





Q1: Probabilities

We have a loaded coin that comes up heads with 0.6 probability.

What's the probability that it comes up tails?

We flip it twice. What's the probability that it never comes up heads?

We now add a fair coin (probability of heads = 0.5). We select a coin at random (0.5 chance), flip it twice and it gives heads twice. What is the probability we picked the loaded coin?

0.590

DONE

Q2 You got it right! x n

A robot lives in the following environment with 4 states:

green	green
red	green

Initially it does not know anything about its location. What probabilities would you assign to each cell?

0.25	0.25
0.25	0.25

Now the robot senses "red" but has an measurement error probability of 0.2. Update your probabilities.

It now moves north by one step (the world is *not* cyclic – so if the robot hits a wall, it just won't move). Update your probabilities.

It now senses "red" again. Update your probabilities.

NEXT

Q2 You got it right! x n

A robot lives in the following environment with 4 states:

green	green
red	green

Initially it does not know anything about its location. What probabilities would you assign to each cell?

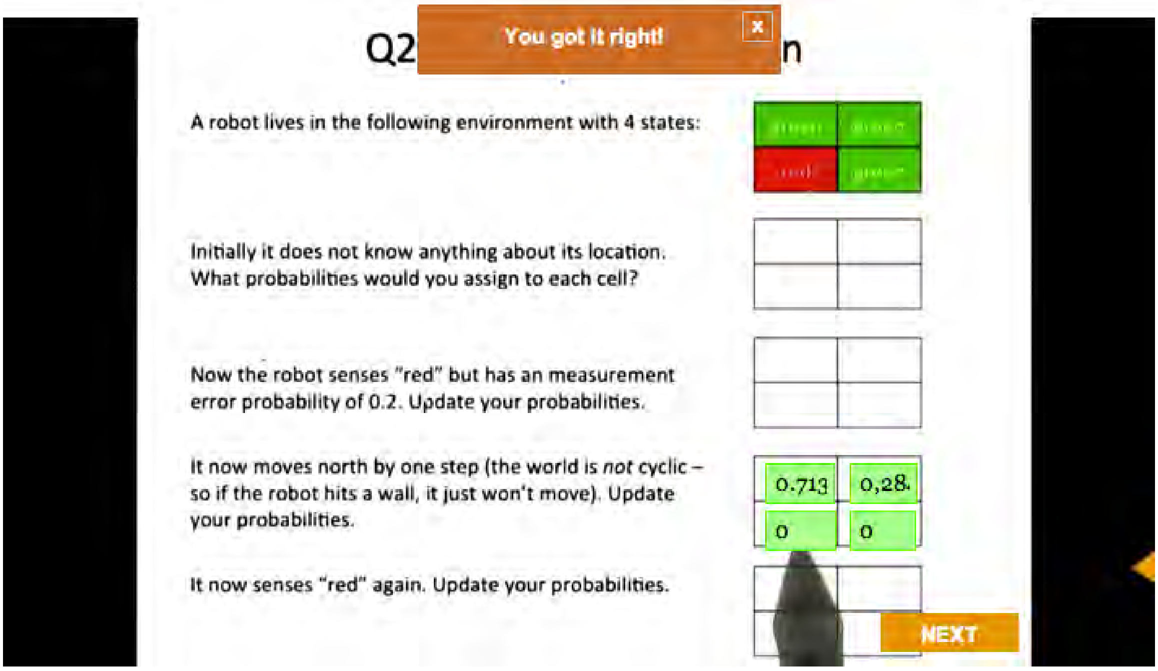
Now the robot senses "red" but has an measurement error probability of 0.2. Update your probabilities.

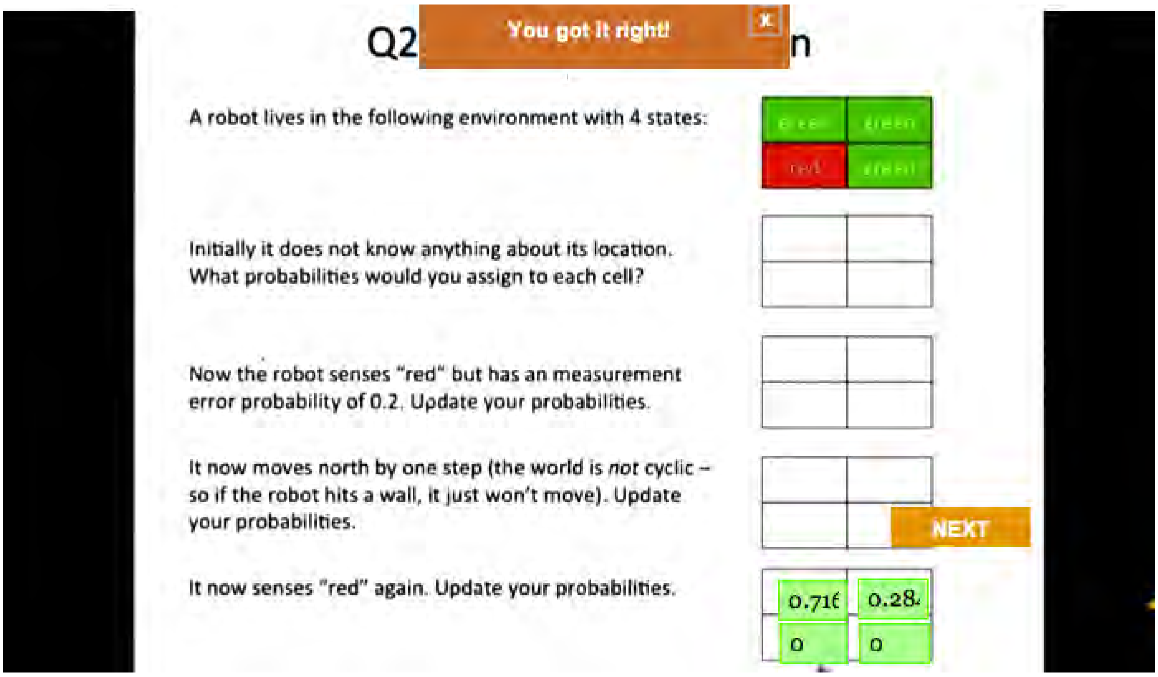
0.142	0.14
0.571	0.14

It now moves north by one step (the world is *not* cyclic – so if the robot hits a wall, it just won't move). Update your probabilities.

It now senses "red" again. Update your probabilities.

NEXT


Q2
You got it right!
x
n
A robot lives in the following environment with 4 states:
Initially it does not know anything about its location.
What probabilities would you assign to each cell?
Now the robot senses "red" but has an measurement
error probability of 0.2. Update your probabilities.
It now moves north by one step (the world is *not* cyclic –
so if the robot hits a wall, it just won't move). Update
your probabilities.
0.713
0,28
0
0
It now senses "red" again. Update your probabilities.
NEXT


Q2
You got it right!
x
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A robot lives in the following environment with 4 states:
Initially it does not know anything about its location.
What probabilities would you assign to each cell?
Now the robot senses "red" but has an measurement
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It now moves north by one step (the world is *not* cyclic –
so if the robot hits a wall, it just won't move). Update
your probabilities.
NEXT
It now senses "red" again. Update your probabilities.
0.716
0.28
0
0

Q3: You got it right! x 's

Compute, for the following two Gaussians, the result of applying Bayes rule. Think of Gaussian 1 as the prior, and Gaussian 2 as the measurement probability.

Gaussian 1		Gaussian 2		Result	
μ	σ^2	μ	σ^2	μ	σ^2
1.0	1.0	1.0	1.0	1	0,5
1.0	1.0	5.0	1.0		
1.0	1.0	5.0	4.0		

NEXT

Q3: You got it right! x 's

Compute, for the following two Gaussians, the result of applying Bayes rule. Think of Gaussian 1 as the prior, and Gaussian 2 as the measurement probability.

Gaussian 1		Gaussian 2		Result	
μ	σ^2	μ	σ^2	μ	σ^2
1.0	1.0	1.0	1.0		
1.0	1.0	5.0	1.0	3	0,5
1.0	1.0	5.0	4.0		

NEXT

Q3: You got it right! x 's

Compute, for the following two Gaussians, the result of applying Bayes rule. Think of Gaussian 1 as the prior, and Gaussian 2 as the measurement probability.

Gaussian 1		Gaussian 2		Result	
μ	σ^2	μ	σ^2	μ	σ^2
1.0	1.0	1.0	1.0		
1.0	1.0	5.0	1.0		
1.0	1.0	5.0	4.0	1.8	0,8

NEXT

You got it right!

Q4. 1-D Kalman Filters

Now compute, for the following two Gaussians, the result of the prediction step in Kalman filters. Think of Gaussian 1 as the probability before motion, and Gaussian 2 as the probability that characterizes the additive effect of robot motion. (While the values are the same as in the previous questions, the results are different.)

Gaussian 1		Gaussian 2		Result	
μ	σ^2	μ	σ^2	μ	σ^2
1.0	1.0	1.0	1.0	2	2
1.0	1.0	5.0	1.0		
1.0	1.0	5.0	4.0		

NEXT

You got it right!

Q4. 1-D Kalman Filters

Now compute, for the following two Gaussians, the result of the prediction step in Kalman filters. Think of Gaussian 1 as the probability before motion, and Gaussian 2 as the probability that characterizes the additive effect of robot motion. (While the values are the same as in the previous questions, the results are different.)

Gaussian 1		Gaussian 2		Result	
μ	σ^2	μ	σ^2	μ	σ^2
1.0	1.0	1.0	1.0		
1.0	1.0	5.0	1.0	6	2
1.0	1.0	5.0	4.0		

NEXT

You got it right!

Q4: 1-D Kalman Filters

Now compute, for the following two Gaussians, the result of the prediction step in Kalman filters. Think of Gaussian 1 as the probability before motion, and Gaussian 2 as the probability that characterizes the additive effect of robot motion. (While the values are the same as in the previous questions, the results are different.)

Gaussian 1		Gaussian 2		Result	
μ	σ^2	μ	σ^2	μ	σ^2
1.0	1.0	1.0	1.0		
1.0	1.0	5.0	1.0		
1.0	1.0	5.0	4.0	6	5

NEXT

You got it right!

A robot lives in the following non-cyclic environment with 4 states:

green	green
red	green

Challenge: In global localization, suppose we have 12 particles. What is the probability that all cells have at least one particle, for the initial uniform sample?

0.873

Assume each cell has exactly 3. What is the normalized sum of all the weights in each cell, if we observe "red" and assume a 0.2 measurement error probability?

Assume each cell has 3 particles. The robot moves north, but the world is not cyclic (so if the robot hits a wall, it just won't move). What is the number of particles in each cell after motion? Assume we use each particle once, ignore resampling, and assume motion is noise-free..

NEXT

You got it right!

A robot lives in the following non-cyclic environment with 4 states:

green	green
red	green

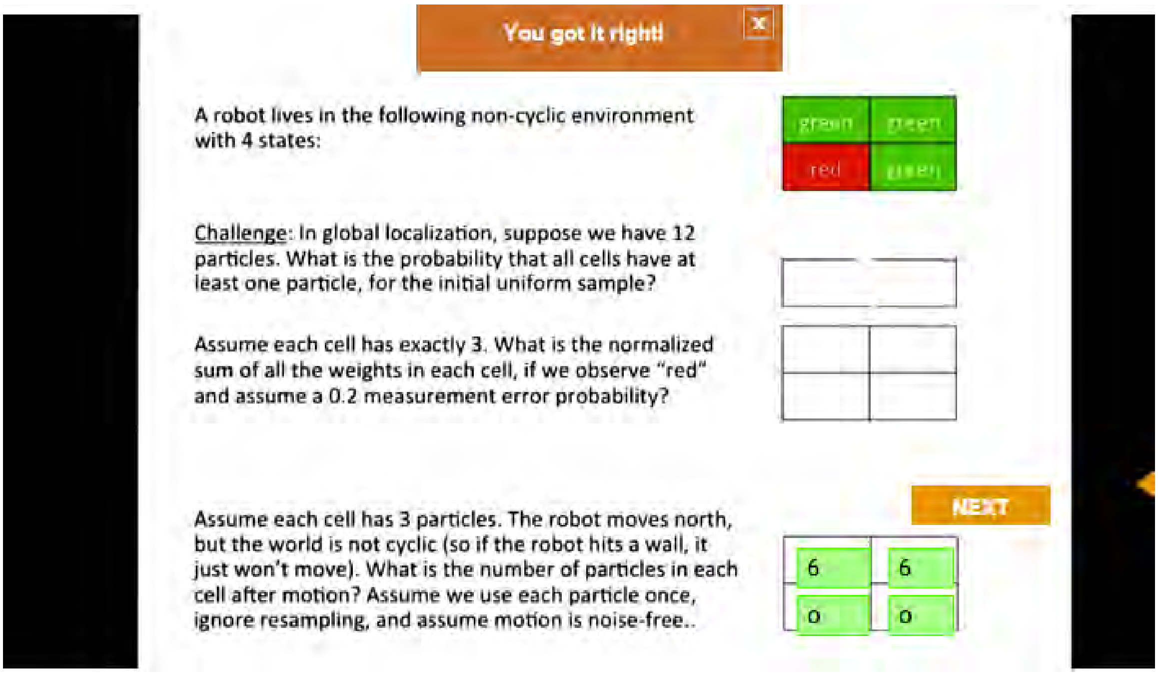
Challenge: In global localization, suppose we have 12 particles. What is the probability that all cells have at least one particle, for the initial uniform sample?

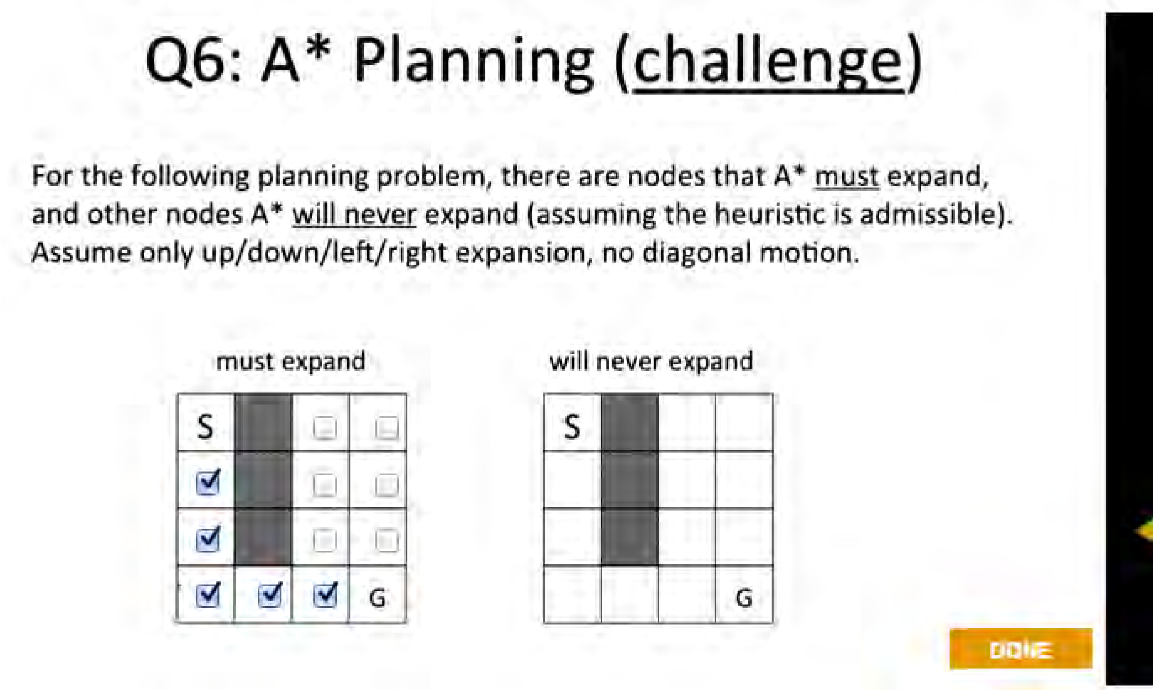
Assume each cell has exactly 3. What is the normalized sum of all the weights in each cell, if we observe "red" and assume a 0.2 measurement error probability?

0.14	0.14:
0.57	0.14:

Assume each cell has 3 particles. The robot moves north, but the world is not cyclic (so if the robot hits a wall, it just won't move). What is the number of particles in each cell after motion? Assume we use each particle once, ignore resampling, and assume motion is noise-free..

NEXT

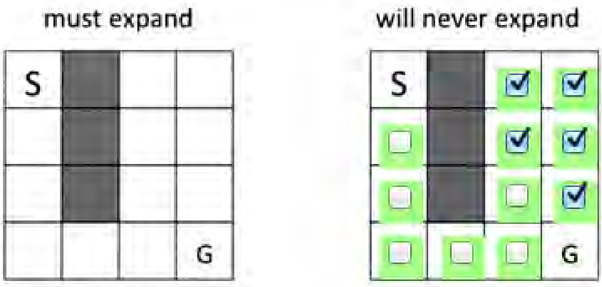

You got it right!
A robot lives in the following non-cyclic environment with 4 states:
green
green
red
green
Challenge: In global localization, suppose we have 12 particles. What is the probability that all cells have at least one particle, for the initial uniform sample?
Assume each cell has exactly 3. What is the normalized sum of all the weights in each cell, if we observe "red" and assume a 0.2 measurement error probability?
NEXT
Assume each cell has 3 particles. The robot moves north, but the world is not cyclic (so if the robot hits a wall, it just won't move). What is the number of particles in each cell after motion? Assume we use each particle once, ignore resampling, and assume motion is noise-free..
6
6
0
0


Q6: A* Planning (challenge)
For the following planning problem, there are nodes that A* must expand, and other nodes A* will never expand (assuming the heuristic is admissible). Assume only up/down/left/right expansion, no diagonal motion.
must expand
S
G
will never expand
S
G
DONE

You got it right!

Q6: A* Pl… enge)

For the following planning problem, there are nodes that A* <u>must</u> expand, and other nodes A* <u>will never</u> expand (assuming the heuristic is admissible). Assume only up/down/left/right expansion, no diagonal motion.



NEXT

You got it right!

Q7…

Say you are having difficulties keeping a car on a circular reference trajectory. What modification could make it easier to stay near the reference trajectory?

- [ ] Increase length of car
- [x] Decrease length of car
- [x] Increase maximum steering angle
- [ ] Increase speed of the car
- [ ] Remove P term from your controller
- [x] Increase the diameter of the circle
- [ ] None of the above

NEXT