جامعة الأخوين

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AL AKHAWAYN UNIVERSITY

Artificial Intelligence

Bust The Ghost Project

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April 20th, 2022

I- Introduction:

In this project, my teammate Oumayma El Ghamrasni and I implemented the game “Bust The Ghost” using Unity. The prior probability we used is 0.006 since we are using an 8 * 20 grid so the probability of finding the ghost in a tile is 1/ (8*20) =0.006.

II- Game Description:

The posterior probability is calculated using the base rule. It reflects a change of belief after clicking on the other tiles. The calculated probability is a combination of color and distance. Also, we used the followingconditional probability distribution P (Color | Distance from Ghost):

For Distance from Ghost=3:

P (yellow |3)	P (orange |3)	P (red |3)	P (green |3)
0.5	0.150	0.050	0.300

For Distance from Ghost=4:

P (yellow |4)	P (orange |4)	P (red |4)	P (green |4)
0.5	0.150	0.050	0.300

For Distance from Ghost=1:

P (yellow |1)	P (orange |1)	P (red |1)	P (green |1)
0.150	0.50	0.3	0.050

For Distance from Ghost=2:

P (yellow |2)	P (orange |2)	P (red |2)	P (green |2)
0.150	0.50	0.3	0.050

For Distance from Ghost=0:

P (yellow |0)	P (orange |0)	P (red |0)	P (green |0)
0.10	0.200	0.650	0.050

For Distance from Ghost>=5:

P (yellow |n)	P (orange |n)	P (red |n)	P (green |n)
0.250	0.100	0.050	0.600

The Joint probability tables we worked with are the following:

Table 1: P (Color, Distance from ghost)

Color	Distance from ghost	P (Color, Distance from ghost)
yellow	3	0.5
yellow	4	0.5
red	3	0.05
red	4	0.05
green	3	0.3
green	4	0.3
orange	3	0.15
orange	4	0.15

Table 2:

Color	Distance from ghost	P (Color, Distance from ghost)
yellow	1	0.15
yellow	2	0.15
red	1	0.3
red	2	0.3
green	1	0.05
green	2	0.05
orange	1	0.5
orange	2	0.5

Table 3:

Color	P (Color, 0)
yellow	0.10
red	0.650
green	0.05
orange	0.2

Table 4:

- For distance n>=5:

Color	P (Color, n)
yellow	0.250
red	0.05
green	0.6
orange	0.1

The game starts with a prior probability of 0.006 for the placement of the ghost since the probability of having the ghost in any tile is uniform 1/ (20*8) which is 0.006 since we have 160 tiles. When the player clicks a tile, the posterior probability P(Ghost_t) gets calculated, based on the observed evidence which is the color of the tile, using the following formulas: P(Ghost_t)=P (Ghost | Color_t)=P(Ghost_t-1) *P (Color | Distance from Ghost), and we display it on the tile after doing normalization. The more tiles the player clicks on the higher the probability printed on one of the tiles which indicates that there is a high chance that the ghost is in that tile.

In this game, we are using probabilistic inference which consists of computing the probability of the existence of the ghost on a tile given its color(evidence). When the player clicks on a tile the probability gets updated based on the new evidence observed. For instance, when a player clicks on a tile and gets the color green, the Bayesian probability displayed on it will decrease also the probability displayed on neighboring tiles will decrease too which indicates that the ghost is far from the clicked position. On the other hand, if the clicked tile has the color orange the Bayesian probability will increase which indicates that the ghost is close to the clicked tile.