COMP341
Assignment 3

Report

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Written Q1:

Pacman’s beliefs do not depend on actions of ghost and Pacman takes into account locations where ghost can locate, which means possibilities. So, we can say that locations and previous ones of ghost are not observed. Briefly, in this context, probabilities are calculated independently of the movement and location of the ghosts. In addition, the presence of multiple ghosts does not affect the situation because Pacman cannot detect their location instantly.

Written Q2:

In this question, Pacman’s beliefs are updated according to its current location. After executing second test case, Pacman is not able to move, so at the end, it can find the location of ghost. But in the third case, it keeps changing its location and update process is on. While moving, Pacman can not detect the location of ghost. Movement is the cause of failure.

Written Q3:

If the weight of all particles is 0, the re-initialization process will start. To find the ghost's location, there must be a weight difference between particles and one particle must outweigh the other particles. Therefore, if all of them have a weight of 0, the uniformly initialize function will run again. In this case, particles should be resampled, and the weight of the updated particles can take different values each time a Pacman move is made.

Written Q4:

After looking at all test cases, we get clearer, target-oriented and faster results in Approximate inference compared to Exact inference. The colors on the map sharpen more easily, so the ghost is found faster. In addition, I can say that we have obtained results close to the theoretical value with 5000 particles. The particle, which is uniformly distributed to each location on a small map, approaches the correct result and works fast based on the samples. The number of 5000 here is sufficient for the grids we have looked at.

Written Q5:

As stated in the text, I generated new positions with the cartesian product in the uniform initialize function and randomly distributed them to the particles. Entries were obtained by cartesian multiplication within legal positions as many as the number of ghosts. Then, the updateObserve function updated the weight of the particles at each Pacman move. Here, the update got the probability by taking the noisy data of each ghost and added the particles by multiplying all the ghosts’. Said probability calculation depends on Pacman position, jail position and ghost's noisy data. It should be noted that particles are resampled after each update.