COMP 341 – ASSIGNMENT 4

REPORT

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Q1) For the random moving ghost, the probabilities remain the same because our agent makes its calculations based on the possible movements of the ghost (which is random), regardless of the real position of the ghost. Therefore, probabilities for a random ghost being on each legal position is the same. For the GoSouthGhost, since the ghost is tend to move south, the probability for a GoSouthGhost being on a southern position gets more likelier as time passes and our agent updates its inference based on ghost's possible movements (moving south is more likely).

Q2) In the first test our agent cannot find the exact position of the ghost, but it finds in the second one. This is because both our agent and the ghost are surrounded by the walls and cannot move in the first test while the agent can move in the second test. Therefore, the first agent can only infer about the distance to the ghost, using its sensor, but cannot infer about the exact position. On the other hand, the second agent can infer about the exact position since it can move and update its inference for different true distances to the ghost.

Q3) Time elapse is not included in the implementation of q4. Therefore, our agent can only infer from its observations using its sensor, which results in the ignorance of ghost's movements in every time step. At some point, the agent may fall in a situation in which it visits all the positions where it thinks the ghost would be. This causes weights for each particle in the distribution to be equal to zero, which means that the agent cannot infer anymore. Increasing the number of particles would not help, because particles would still get re-initialized at some point since time elapse is not included.

Q4) Exact inference cases result in better accuracy compared to approximate inference. This is because we use sampling in the approximate inference case and probabilities get into the problem, while exact inference relies upon the real data. If time elapse is included in the implementation, increasing the number of particles result in better accuracies for approximate inference, especially when the map is big and there are many possible positions. Therefore, 5000 particles does make sense for q5.

Q5) In the elapse time implementation, for each particle (tuple of ghosts' positions) I iterated over each ghost to update the position of the specific ghost in the particle. I used the method *getPositionDistributionForGhost* for getting the distribution for the specific ghost and then I sampled from this distribution to get the new position and place it in the new particle.