Artificial Intelligence Homework 3
Inference

2019/11/20

Question 1 - Exact Inference Observation

- Updates beliefs based on the distance observation and Pacman's position.
- Observe a ghost one time
- class ExactInference(InferenceModule):
- observe(self, observation, gameState):
  - If noisyDistance is None, handle the "jail" edge case
  - Otherwise, apply inference rules
    - Be sure to know the meaning of emissionModel and self.beliefs

Question 2 - Exact Inference with Time Elapse

- A ghost moves only one step one time
- elapseTime(self, gameState):
  - Get ghosts’ position at time t by self.legalPositions
  - Realize how self.getPositionDistribution work

Question 3 - Exact Inference Full Test

- Combine question 1 and 2
- class GreedyBustersAgent(BustersAgent)
- chooseAction(self, gameState)
  - Get pacman’s successors first
  - Use livingGhostPositionDistributions to find ghosts’ possible positions
  - Choose a best action

Question 4 - Approximate Inference Observation

- Use a particle filter for approximately tracking a ghost
- class ParticleFilter(InferenceModule)
- initializeUniformly(self, gameState)
- getBeliefDistribution(self):
  - Use particles to get current belief state
- observe(self, observation, gameState):
  - If noisyDistance is None, handle the "jail" edge case
  - Otherwise, use emissionModel and current belief to estimate particles’ weights, then resample
  - Remember to handle the situation when all particles receive zero weight

Question 5 - Approximate Inference with Time Elapse

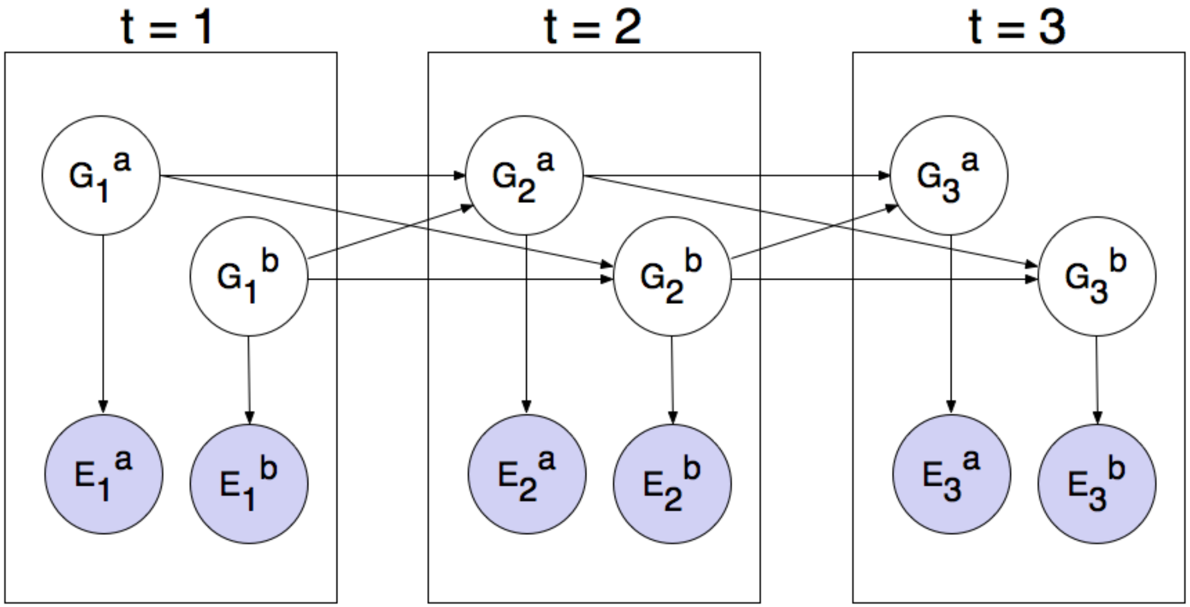
- A ghost moves only one step one time
- elapseTime(self, gameState):
  - Sample next position of each particle

Question 6 – Joint Particle Filter Observation

- Use a joint particle filter for approximately tracking a ghost
- class JointParticleFilter()
- initializeParticles(self, gameState):
    - Each particle is a tuple of ghost positions
    - itertools.product() may be helpful
- getBeliefDistribution(self):
    - Use particles to get current belief state

Question 6 – Joint Particle Filter Observation

- observe(self, observation, gameState):
  - If some of noisyDistances is None, handle the "jail" edge case
  - Use emissionModels and current belief to estimate a particle's weight by considering "all ghosts simultaneously"
  - Remember to handle the situation when all particles receive zero weight



Question 7 – Joint Particle Filter with Time Elapse

- A ghost moves only one step one time
- elapseTime(self, gameState):
  - Sample next position of each particle by considering “all ghosts simultaneously”

Submission

- Please use .zip or .gz file (no .rar or anything else) to package the files you need to submit (i.e. valueIterationAgents.py, qlearningAgents.py, analysis.py, bustersAgents.py, inference.py) directly (don’t create any folder).
- Verify your uploaded file by downloading it on ceiba
- Check the deadline carefully

Deadline

- 2019/12/04 27:00 (2019/12/05 03:00)
- Allow late submission until 2019/12/11 27:00
- At most 5 minutes for each test case
- Test on Intel(R) Core i7-6700 CPU @ 3.4GHz