

Artificial Intelligence Homework 3

Inference

2017/11/01

Question 1 - Exact Inference Observation

- Updates beliefs based on the distance observation and Pacman's position.
- Observe a ghost one time beliefs = counter keep tracks of a set of keys
- `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

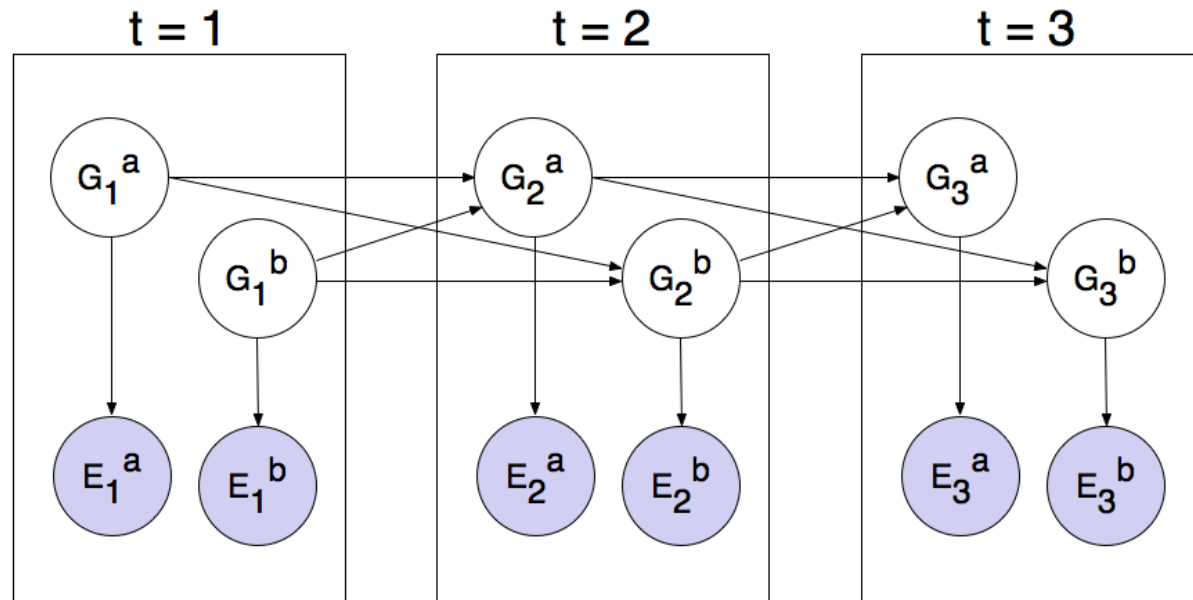
- A ghost moves only one step one time
- `elapseTime(self, gameState):`
 - Sample next position of each particle

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. `busters` `Agents.py`, `inference.py`) directly (don't create any folder).
- Verify your uploaded file by downloading it on ceiba
- Check the deadline carefully

Deadline

- 2017/11/22 27:00 (2017/11/23 03:00)
- Allow late submission until 2017/11/29 27:00
- At most 5 minutes for each test case
- Test on Intel(R) Core TM i7-2600 CPU @ 3.4GHz