p4_tracking_q6_joint_particle_filter_observation

Question 6 (4 points): Joint Particle Filter Observation

So far, we have tracked each ghost independently, which works fine for the default `RandomGhost` or more advanced `DirectionalGhost`. However, the prized `DispersingGhost` chooses actions that avoid other ghosts. Since the ghosts' transition models are no longer independent, all ghosts must be tracked jointly in a dynamic Bayes net!

The Bayes net has the following structure, where the hidden variables G represent ghost positions and the emission variables E are the noisy distances to each ghost. This structure can be extended to more ghosts, but only two (a and b) are shown below.

You will now implement a particle filter that tracks multiple ghosts simultaneously. Each particle will represent a tuple of ghost positions that is a sample of where all the ghosts are at the present time. The code is already set up to extract marginal distributions about each ghost from the joint inference algorithm you will create, so that belief clouds about individual ghosts can be displayed.

Complete the `initializeParticles`, `getBeliefDistribution`, and `observeState` method in `JointParticleFilter` to weight and resample the whole list of particles based on new evidence. As before, a correct implementation should also handle two special cases. (1) When all your particles receive zero weight based on the evidence, you should resample all particles from the prior to recover. (2) When a ghost is eaten, you should update all particles to place that ghost in its prison cell, as described in the comments of `observeState`.

You should now effectively track dispersing ghosts. To run the autograder for this question and visualize the output:

```
python autograder.py -q q6
```