INFO8006: Project 3 - Report

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1 Bayes filter

a. The observable evidence variables at time t are defined in this way for the ghost i :

$$noisyDistance(i) = manhattanDistance(ghost(i), Pacman) + Binom(n, p) - n * p$$

where *noisyDistance(i)* corresponds to the observable evidence variable which is tracking the ghost i at time t, *manhattanDistance(ghost(i), Pacman)* corresponds to the Manhattan distance between the ghost i and Pacman at time t, *Binom(n, p)* corresponds to a random variate following a binomial distribution with the given parameters n and p, $p = \frac{1}{2}$, and n = $\frac{sensor\_var}{p\ (1-p)} = \frac{sensor\_var}{\frac{1}{4}}$ with *sensor_var* being the variance of the rusty sensor.

b. The transition model $P_a(X_t|X_{t-1}, g)$, with a being a legal action taken and g being the type of ghost (confused, afraid, scared), is, in general, $P_a(X_t|X_{t-1}, g) = \alpha * \gamma$. In detail :

$$P_a(X_t|X_{t-1}, g) = \begin{cases} P_a(X_t|X_{t-1}, g) = \alpha * 1 \text{ if g = confused} \\ P_a(X_t|X_{t-1}, g) = \alpha * 2 \text{ if g = afraid and } d(X_t, P) \geq d(X_{t-1}, P) \\ P_a(X_t|X_{t-1}, g) = \alpha * 8 \text{ if g = scared and } d(X_t, P) \geq d(X_{t-1}, P) \\ P_a(X_t|X_{t-1}, g) = \alpha * 1 \text{ else} \end{cases}$$

where:

- $d(X_t, P)$ is the Manhattan distance between Pacman and the ghost at time t.
- $\alpha = \frac{1}{\sum_{i=1}^{N} \gamma_i}$ with N being the number of legal actions.

2 Implementation

a. ***Leave empty.***

3 Experiment

a.

b.

c.

d.

e.

f.

g. ***Leave empty.***