XCS221 Assignment 4

JUAN RICARDO PEDRAZA ESCOBAR

Artificial Intelligence: Principles and Techniques

Stanford Center for Professional Development

January ,2022

1.a

The recurrence for $Vminmax\ (s\ ,d)$ is given as:

$$Vminmax(s,d) = \begin{cases} Utiliy\ (s), & If\ IsEnd == True \\ Eval\ (s), & If\ d == 0 \\ \max\limits_{a\ \in\ Actions\ (s)} V_{minmax}(Succ(s,a),d), & If\ Player(s) = a_0\ Pacman \\ \min\limits_{a\ \in\ Actions(s)} V_{minmax}(Succ(s,a),d), & If\ \ Player(s) = \ a_1 \ldots\ldots a_{n-1}\ Ghost \\ \min\limits_{a\ \in\ Actions(s)} V_{minmax}(Succ(s,a),d-1), & If\ Player(s) = a_n\ \ Last\ Ghost \end{cases}$$

Note that,

- There are a total of n+1 agents labelled as a_i for i=0 to n.
- For n ghosts, recursing through all n of them is considered a depth of 1. So we need to adjust our $(d\ -\ 1)$ on the last part of the piecewise function.

3.a

The recurrence $Vexptmax\ (s\ ,d)$ is given as:

$$Vexptmax(s,d) = \begin{cases} Utiliy\ (s), & If\ IsEnd == True \\ Eval\ (s), & If\ d == 0 \\ \max\limits_{a\ \in\ Actions\ (s)} V_{exptmax}(Succ(s,a),d), & If\ Player(s) = a_0\ \ Pacman \\ \frac{1}{|Actions(s)|}\sum_{a\ \in Actions(s)} V_{exptmax\ (succ(s,a),d)}\ , & If\ \ Player(s) = \ a_1 \ldots\ldots a_{n-1}\ Ghost \\ \frac{1}{|Actions(s)|}\sum_{a\ \in Actions(s)} V_{exptmax\ (succ(s,a),d-1)}\ , & If\ Player(s) = a_n\ Last\ Ghost \end{cases}$$

Note that,

- In this case the ghosts′ agents actions are random.
- we take the average motion of the ghosts, uniformly sampling the ghost′s agents motion.