Introduction to Artificial Intelligence and Machine Learning
Homework 2 – Multiagnet

2018/10/17

Question 1 – Reflex Agent

- Given a game state, a reflex agent chooses the action that leads to the highest value of evaluation function.
- evaluationFunction(self, currentGameState, action)
    1. Generate successor
    2. Return score of the successor

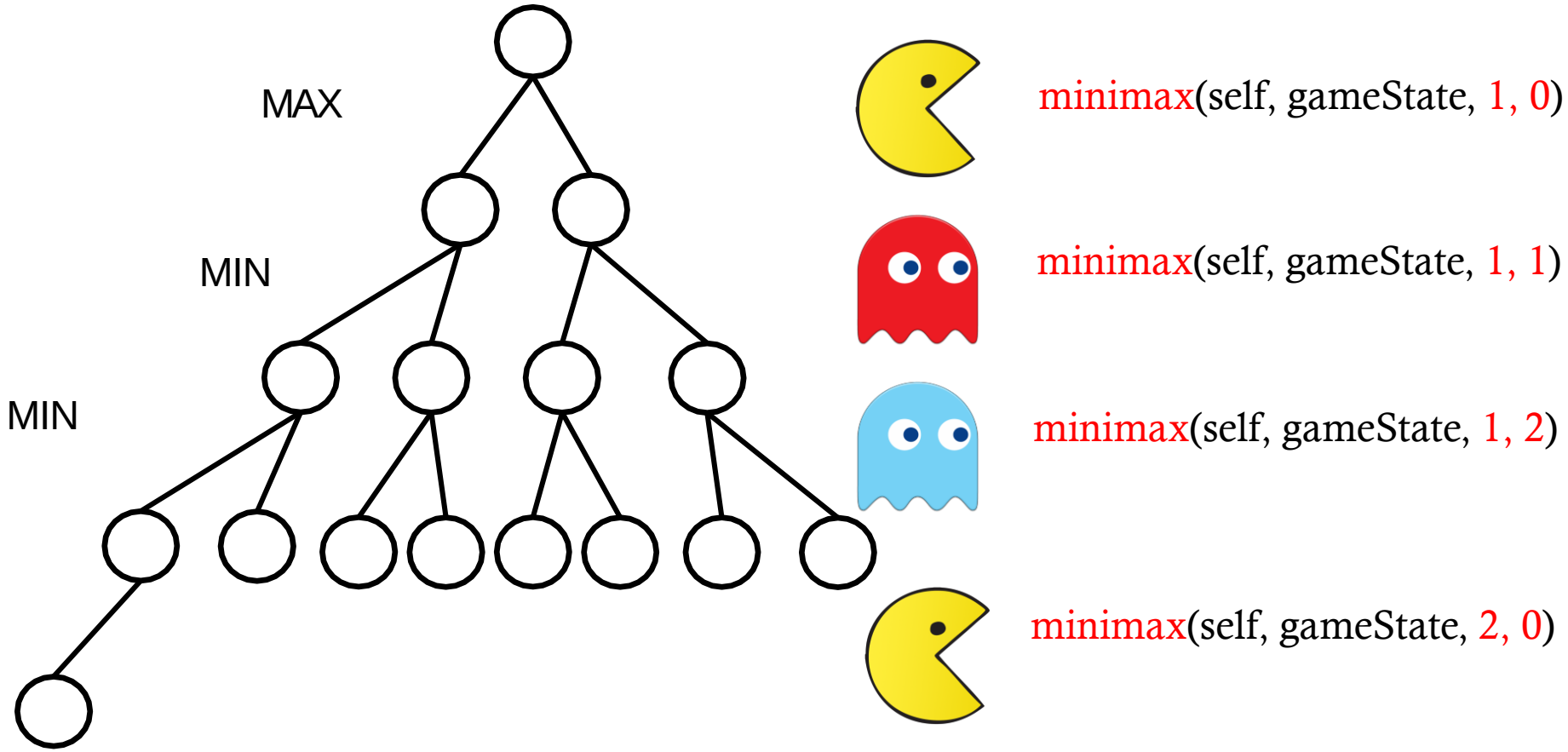
Hints:

1. Avoid the ghosts
2. Move toward the nearest food
3. Eat the capsule then go chasing the ghosts

Question 2 – Minimax Agent

- Given a game state, a reflex agent chooses the action that leads to the highest value of evaluation function.
- getAction(self, gameState)
  1. Evaluate best action by minimax
  2. Return best action
- minimax(self, gameState, depth, agentIndex)
  - 1 depth: MAX, MIN, MIN, … , MIN
  - recursive call

Question 2 – Minimax Agent



minimax(self, gameState, 1, 0)

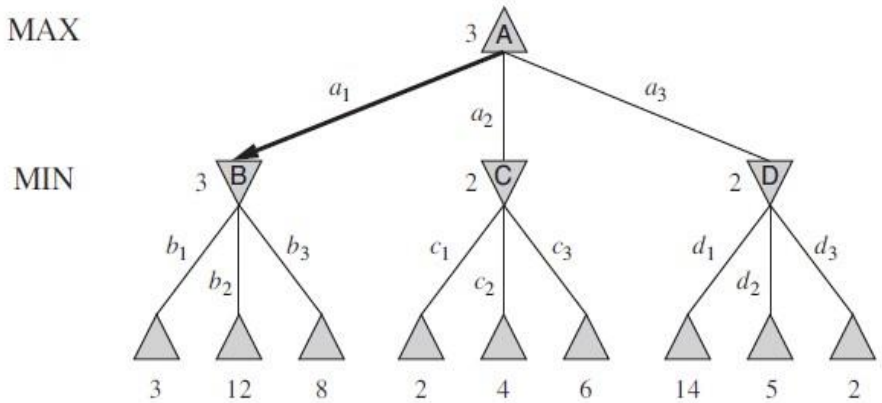
minimax(self, gameState, 1, 1)

minimax(self, gameState, 1, 2)

minimax(self, gameState, 2, 0)

Question 2 – Minimax Agent

$$\textsc{Minimax}(s) = \begin{cases} \textsc{Utility}(s) & \text{if } \textsc{Terminal-Test}(s) \\ \max_{a \in Actions(s)} \textsc{Minimax}(\textsc{Result}(s, a)) & \text{if } \textsc{Player}(s) = \textsc{max} \\ \min_{a \in Actions(s)} \textsc{Minimax}(\textsc{Result}(s, a)) & \text{if } \textsc{Player}(s) = \textsc{min} \end{cases}$$



Minimax Search

Question 3 – Alpha Beta Agent

- getAction(self, gameState)
  - – nearly the same as minimax agent
- alphabeta(self, gameState, depth, agentIndex, alpha, beta)

Question 4 – Expected Minimax Agent

- getAction(self, gameState)
  - nearly the same as minimax agent
- expectiMinimax(self, gameState, depth, agentIndex)
  - nearly the same as minimax agent, except…
  - The ghosts don't return the min of all game values, they return the average of them.

Question 5 – Better Evaluation Function

- Originally, the evaluation is based on the score of the given state.
- Try to “eat” the ghost in the game!
- This evaluation function is different from the one of Question 1 in that here the evaluation is only a function of game state, where as in Question 1 the evaluation is a function of game state and action.
- Remember to write your documentation! (only for Q5)
- Hints: Run BFS to find ghosts and foods; Eat capsules and chase ghosts

Additional

- Use .zip or .gz file (no .rar or anything else) to package the files you need to submit (no other unnecessary files)
- Verify your uploaded file by downloading it on ceiba
- Check the deadline carefully

Deadline

- 2018/10/31 27:00 (2018/11/1 03:00)
- Allow late submission until 2018/11/07 27:00