A2: Games

(1.0)

* Describe the possible states, initial state, transition function.
* Possible states S, the red and white checkers corresponding to the two players can only occupy the black squares (i.e. by moving diagonally) and the possible states are the different ways the red and white checkers are distributed on the board.
* Initial state s0, the two players have all their 12-checkers positioned at the end on opposite side of the board (all on black squares).
* Transition function ( is a subset of S), given a player and a state the transition function returns the possible game states that the player may achieve with one legal move.
* Describe the terminal state of both checkers and tic-tac-toe.
* Checkers, the terminal state st is when the transition function μ reaches a state and player p is about to play, i.e. there are no more possible moves for player p.
* Tic-tac-toe, the terminal state st is when a

(1.1)

* Why is a valid heuristic function for checkers (knowing that A plays white and B plays red).
* It defines a relaxed problem for the game, it returns the how well A is doing compared to B. The greater value takes on the better A is playing at state s, i.e. the more checkers it has left.
* When does v best approximate the utility function, and why?
* A utility function is used as a theoretical device and intuitively they describe how a perfect player would play. is a sub-problem telling how many more checkers A have than B. best approximates the utility function when the A is playing as good as possible (according to the sub-problem), that is when is maximized.

(Notice that does not necessarily be zero, since a game can be won by A when B cannot move due to being blocked. But, only tells us about the number of checkers left not of how they are distributed, thus this is another sub-problem and can thus be treated as another utility function).

* Can you provide an example of a state where and B wins in the following turn? (Hint: recall the rules for jumping in checkers)
* At state s A will have more checkers than B, but A’s checkers will in this case be positioned in a way that B can make a sequence of jumps over A’s checkers until either all of them have been jumped over or A is in a position where it can’t make a move in the following turn.

(1.2)

* Will η suffer from the same problem (referred to in the last question) as the evaluation function v?
* (for example), tells us how many more reachable terminal states that result in a victory for player A than for player B. But, it tells nothing of the distribution of such states, and how B can do to counteract those moves. η assumes B plays randomly and assigns the same weight to moves of player B independent of their outcome. And because of that η will suffer from similar problem as v since A may as well choose a good action as a bad, where a bad move of A is to advantage for B.