CS 4100/5100: Foundations of Artificial Intelligence (Fall 2015) Robert Platt
Student(s): Oct. 1, 2015

Adversarial Search

In this problem set, upward triangles represent Maximizers, downward triangles represent Minimizers, circles represent Expect nodes and squares represent terminal states.

1 Minimax

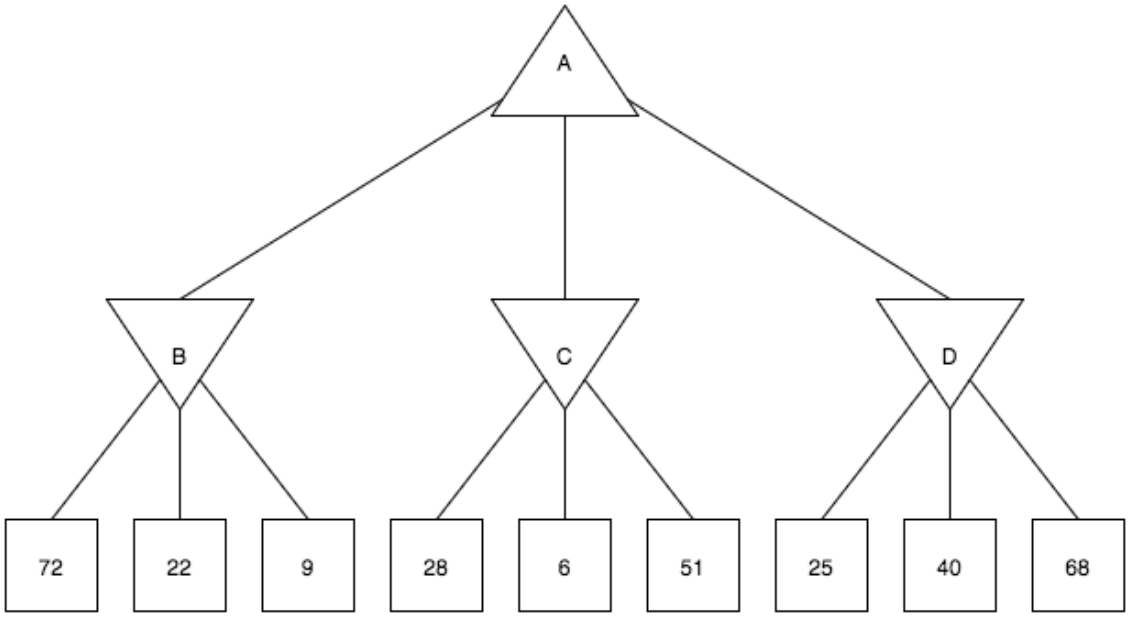

Figure 1: Minimax

1. For the Minimax tree above, what is the value of A,B,C,D?

   A:

   B:

   C:

   D:

2 Expectimax

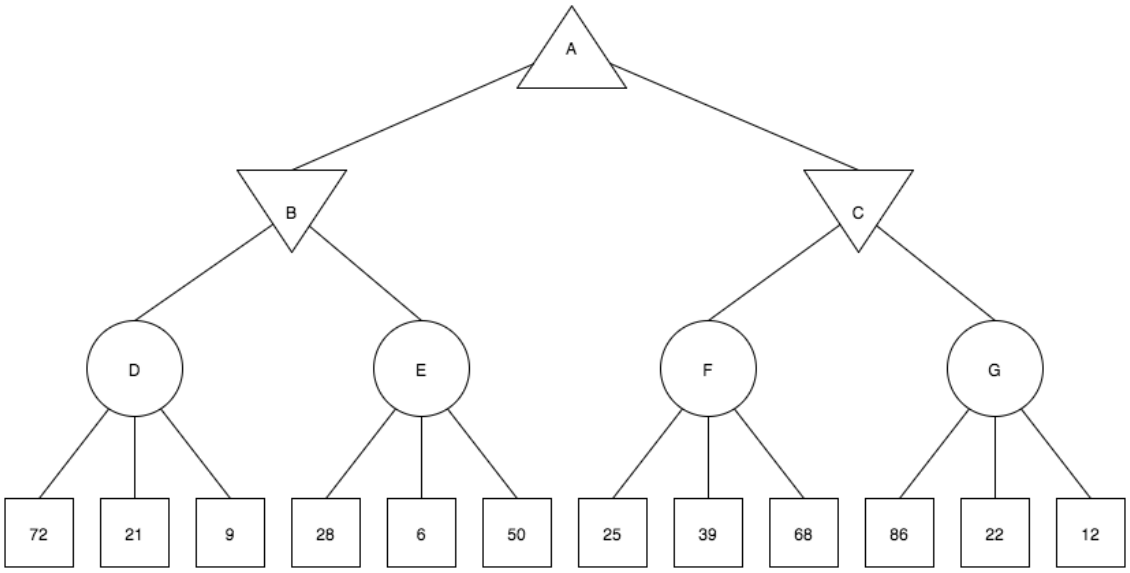

Figure 2: Expectimax

1. For the Expectimax tree above, what is the value of A,B,C,D,E,F,G?

   A:

   B:

   C:

   D:

   E:

   F:

   G:

3 Pacman

1. In pacman game (pacman, ghost, food, power pellets), what are the maximizers and minimizers?

2. How would you evaluate a intermediate state?

3. What if ghosts don't play optimal, will the minimax strategy always be the optimal strategy? Why?

4. If the ghosts play random and the pacman KNOWS that, can you find a strategy for pacman better than the minimax? If yes, please give the strategy and an example game tree, otherwise please state why.

5. If the ghosts play random but the pacman DOESN'T KNOW that and plays optimal, will the minimax strategy GUARANTEE a better outcome for pacman than the outcome when the ghosts play optimal? why?

4 Alpha-Beta Pruning

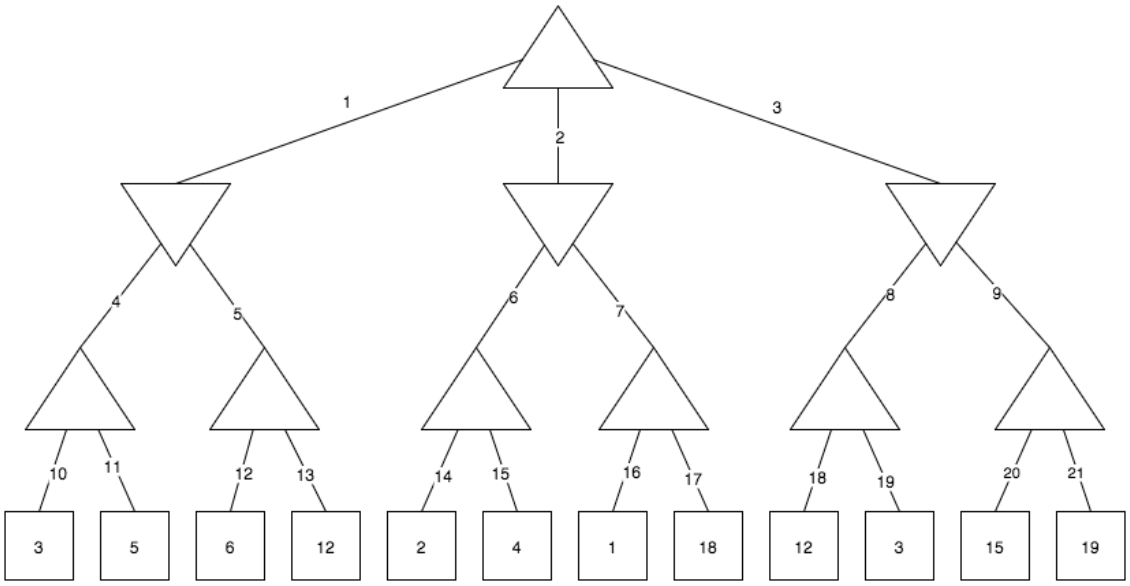

Figure 3: Alpha-Beta Pruning

1. Please fill in the state's utility values for the game tree above using alpha-beta pruning, cross the pruned edges and write down the Alpha Beta value from the parent state to the child state. You don't need to write Alpah-Beta values for the edges that have been pruned and the utility values for the pruned states.

	Alpha	Beta
1	$-\infty$	$+\infty$
2		
3		
4		
5		
6		
7		
8		
9		
10		

	Alpha	Beta
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		