CSCI 4350/5350

Milan Zanussi

Homework 3

Due: Thursday, October 4 by 11:00pm

1. (4 points) Give the name of the algorithm that results from these special cases:
   a) Local beam search with k=1

      Gradient Ascent

   b) Simulated annealing with T=0 at all times

      Gradient Ascent

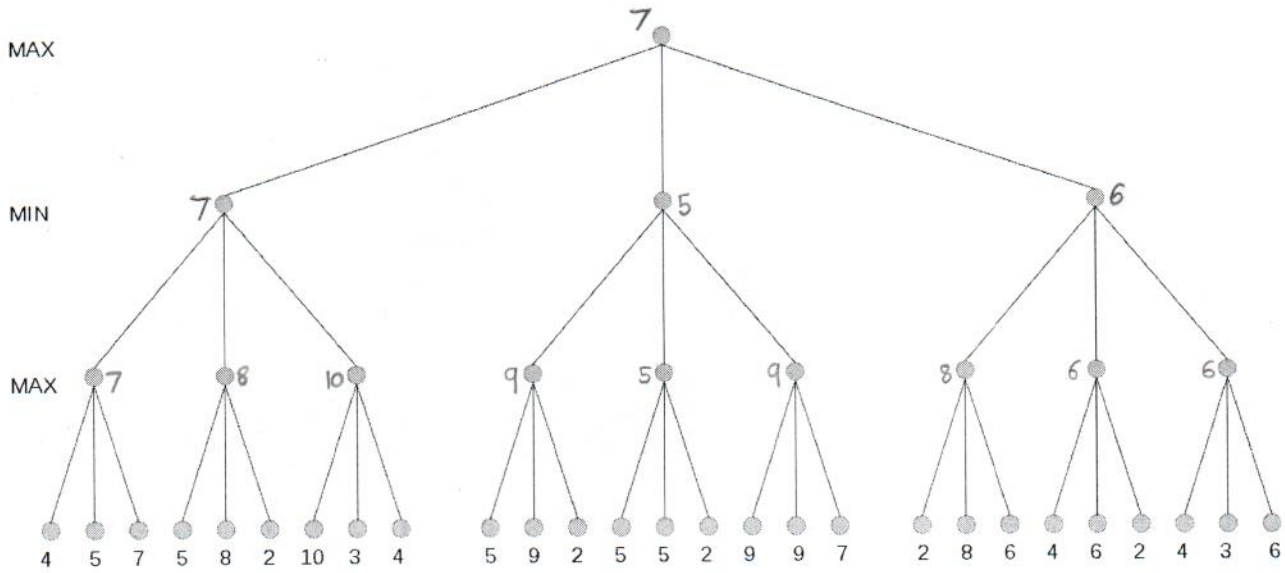
   c) Simulated annealing with T=infinity at all times

      Randomized Search

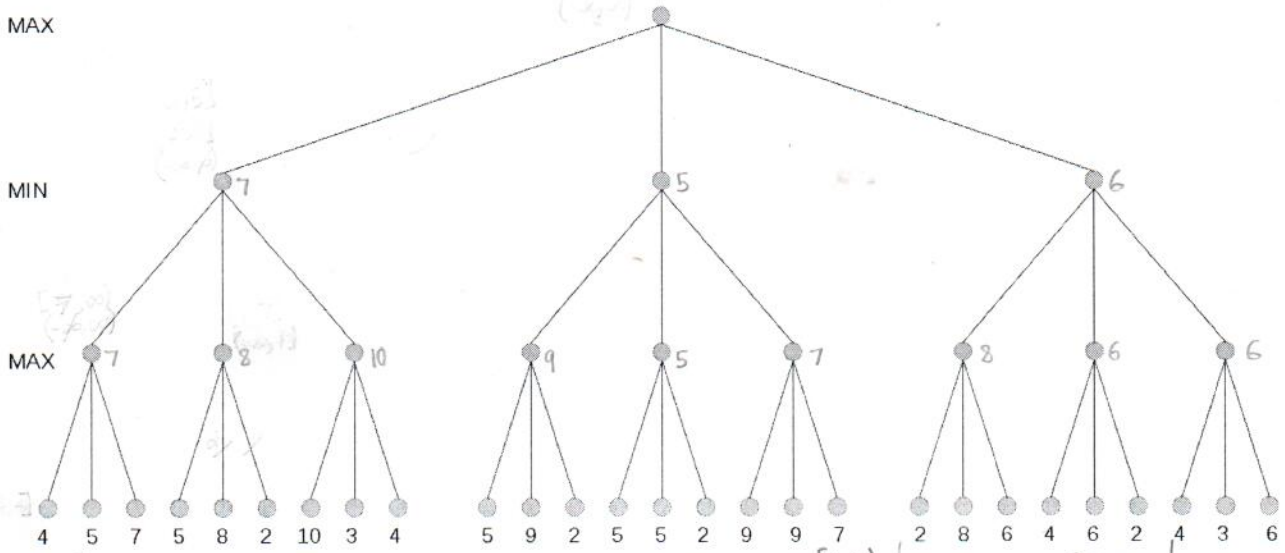
   d) Genetic algorithm with a population size of N=1

      Randomized Search

2. (8 points) A game tree of depth 4 is shown below, and the root is a MAX node. The utilities of the terminal nodes (green) are provided as well. Use MINIMAX to decide which move should be made from the root. **(1) Write the backed-up MINIMAX value beside each node and (2) mark the selected path.**



3. (8 points) The same game tree is shown below. Conduct an alpha-beta pruning by generating left-most nodes first. **(1) Indicate where and which (α or β) cutoffs occur, (2) circle the nodes which were generated and (3) write the MINIMAX values beside each generated node.**



Step 1:
$\alpha = -\infty$
$\beta = \infty$
$(-\infty, \infty)$

Step 2:
$\alpha = -\infty$
$\beta = \infty$

Step 3:
$\alpha = -\infty$
$\beta = \infty$

Step 4:
$\alpha = -\infty$
$\beta = 4$
$[4, \infty)$

Step 5:
$\alpha = -\infty$
$\beta = 5$
$[5, \infty)$

Step 6:
$\alpha = -\infty$
$\beta = 7$
$[7, \infty)$

Step 7:
$\alpha = -\infty$
$\beta = 7$
$(-\infty, 7]$

Step 8:
$\alpha = -\infty$
$\beta = 5$
$[5, 7]$

Step 9:
$\alpha = -\infty$
$\beta = 8$
β-Cut
$[8, 7]$

Step 10:
$\alpha = -\infty$
$\beta = 7$
$(-\infty, 7]$

Step 11:
$\alpha = -\infty$
$\beta = 10$
β-Cut
$[10, 7]$

Step 12:
$\alpha = 7$
$\beta = \infty$
$(-\infty, 7]$ $[7, \infty)$

Step 13:
$\alpha = 7$
$\beta = \infty$
$[7, \infty)$

Step 17:
$\alpha = -\infty$
$\beta = 5$
$[7, \infty)$

Step 18:
$\alpha = -\infty$
$\beta = 9$
$[9, \infty)$

Step 19:
$\alpha = -\infty$
$\beta = 2$
$(9, \infty)$

Step 20:
$\alpha = 7$
$\beta = 9$
$[7, 9]$ $[7, 9]$

Step 21:
$\alpha = -\infty$
$\beta = 5$
$[7, 9]$

Step 22:
$\alpha = -\infty$
$\beta = 5$
$[5, 9]$

Step 23:
$\alpha = 5$
$\beta = 9$
$[5, 9]$

Step 24:
$\alpha =$