Ma 661 Dynamic Programming and Reinforcement Learning
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Homework 5

due Wednesday, April 8, 2020

Problem 1. Consider the chess game from Assignment 2. Assume that if you play timid your probability of making a draw is p = 0.8 and the probability to win is the same as the probability to lose.

(a) Solve the problem again with this new probability setting.

(b) Investigate how your strategy changes when the probability of wining changes in the case of a timid play. The probability of wining can change from 0 to 0.15.

Problem 2. We have a tree farm. At any time, the size s of a tree is $0, 1, 2, 3, 4$, where 0 means that the tree has died, and 4 is the size of a mature tree. We need to decide when to harvest a given tree. Each year it costs about \$ 10+s to maintain a tree, and \$ 30+5s to harvest a tree. The sales price of a tree of each size is as follows:

Tree size	1	2	3	4
Sales Price	\$ 150	\$ 180	\$ 210	\$ 260

The transition probability matrix for the size of the tree is as follows:

sizes	0	1	2	3	4
0	1	0	0	0	0
1	0.05	0.15	0.7	0.1	0
2	0.05	0	0.2	0.7	0.05
3	0.05	0	0	0.5	0.45
4	0.05	0	0	0	0.95

(a) Describe a dynamic programming problem to determine an optimal harvesting policy.

(b) Solve the problem numerically. What numerical methods are applicable to this problem and why?