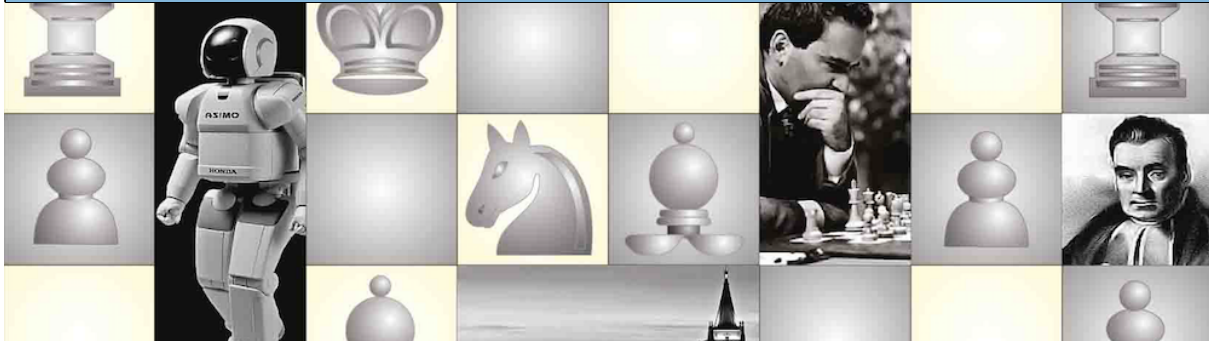


Fall 2023 - CSC545/645 Artificial Intelligence - Assignment 6



Due date: Thursday, October 12, 2023, 2:00 pm. Please create a folder called `assignment6` in your local working copy of the repository and place all files and folders necessary for the assignment in this folder. Once done with the assignment, add the files and folders to the repo with `svn add files,folders` and then commit with `svn ci -m "SOME USEFUL MESSAGE" files,folders`. You know that the assignment is uploaded when you see the message "Transmitting..." followed by a revision number.

Exercise 6.1 [12 points]

Read chapter 5 of the textbook.

1. Discuss how well the standard approach to game playing (Minimax, Expectiminimax) would apply to games such as tennis, pool, and soccer, which take place in a continuous, physical state space. Here are some hints for the discussion: a) Would the approach work? b) What would be the state space size? c) What would it take to make the approach work in theory? d) Would it work in practice?

[6 points]

2. Describe how the minimax and alpha-beta algorithms change for two-player, nonzero-sum games, in which each player has his or her own utility function (for the leaf nodes). You may assume that each player knows the other's utility function. If there are no constraints on the two terminal utilities, is it possible for any node to be pruned by alpha-beta? Discuss this subject.

[6 points]

Exercise 6.2 [8 points]

Implement the minimax and the alpha-beta pruning algorithm. Use TicTacToe as your example to test the algorithms. Evaluate the number of iterations with and without pruning. You may want to use the framework that Alexander Härtl ([Java](#)) and Fan Zhang ([Python](#)) have prepared for you.

[8 points]