CMSC 170 - Introduction to Artificial Intelligence

2nd Semester AY 2015-2016

Lab Topic 10 - Designing an AI Agent for the Tic-Tac-Toe Game

CNM Peralta

Background

Tic-Tac-Toe is a paper-and-pencil game for two players, X and O, who take turns marking spaces in a 3 × 3 grid. The first player to place three eight-connected markers wins the game (either 3 X's for Player X or 3 O's for Player O). Tic-Tac-Toe has 26,830 possible games. Despite this vast variety of possible games, and assuming that Player X plays first, there are 91 unique end-games where Player X wins, 44 unique end-games where Player O wins, and 3 unique end-games that are draws.

Tic-Tac-Toe is one of the games that is commonly used to demonstrate the usage of the minimax algorithm and/or alpha-beta pruning because its state space is still reasonably within the limits of modern day consumer computers.

Exercise

This exercise will be *by pair*. Each pair is required to create an AI player that will play against a human player. To get full points, your AI should never lose; it will always win or get a draw. The exercise will be presented on the last week of classes (May 16-20, 2016). A milestone presentation of any AI (may be rudimentary or fully working) should be given by each pair on the week of May 9-13, 2016. The AI should be able to give a/an [intelligent] move given the human player's move. No UI is required for the milestone presentation, but failure to present will earn you a 15% deduction. For the final presentation, a UI is required; no UI in the final presentation will earn you a 20% deduction.

The breakdown of points for the exercise is as follows:

Criterion	Points
Playable user interface	5
Use of minimax algorithm	10
Alpha-beta pruning	5
Total Score	20

Additionally, the following optional tasks will get you additional points:

- Implementation of an evaluation/utility estimation function to facilitate cutting off the search for a next move at a certain depth: +5 points

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