Project for 5002 Details

The project is a group assignment. Each group has 4 students. Each student should submit a report focusing on the part he/she is responsible for. If some group members have closely overlapped and related work (e.g. various functions in the program), report the whole result emphasizing his/her contribution. If the distribution is highly imbalance, the one does less work will get lower grade than the group grade.

The object of this project is to understand Monte Carlo Tree Search (MCTS). You are asked to research online and write a short essay (1-3 pages) on the topic. Write a fully functional program on MCTS. Using this algorithm, implement a Five-in-a-Row game between a user and an intelligent computer.

There are many tutorials on the Monte Carlo Tree Search. One of the good references can be found here. https://int8.io/monte-carlo-tree-search-beginners-guide/

The notation and convention there are different than those in the lecture. For example, win/loss corresponds to 1/-1, draw is 0. It is fine to work with any convention you like.

In the meanwhile, you may be able to find codes written by others of the MCTS algorithms. Directly using others code is prohibited. Plagiarism will be tested for your python code using MOSS and other detection tools. Copied code with renamed function will be detected as plagiarism as well.

The grading rubric are set as follows.

(a). If the group can implement the game with a trivial 4 by 4 board, the group get 80/100. In this case, the game result, in any scenario, is a draw.

Therefore, it is easy to check the correctness of your code. For this case, please test your code with an arbitrary game state and see if all children (next moves) have (almost) equal rewards. Save a screenshot of this test result for grading reference.

(b). If the group can implement a Game AI on a 6 by 6 board, the group get 90/100. The program should be smart enough not to lose roughly 90% of the game, with many of the games ending with a draw due to the limitation of the board.

(c). If the group can implement an intelligent game program on an 8 by 8 or above board, the group get full score. The algorithms must choose the children in a smart way rather than randomly choose the available states. Note, the thinking period for each move should be no more than 10s.

Please submit your code, screenshots of the game and test result, short essay to Canvas by Dec 20th . Hope you will master and appreciate the Monte Carlo Tree Search during this project.