

Assignment 3B

CSE 473 – Introduction to Artificial Intelligence, University of Washington, Spring 2010.

Due Friday, May 21, at 5:00 PM.

This assignment is optional. If you choose to take part in it, you can gain up to 30 points – up to 25 for improvements to your program and 5 points for turning appropriate transcripts. In addition, you may become eligible for a few additional points to be awarded to finalists and winner(s) of the best utterances competition. Doing this assignment might be particularly attractive if you lost points for lateness on Assignment 3 or felt that your agent was just on the verge of being able to play well or make appropriate utterances when you ran out of development time.

1. Make improvements to your agent's playing ability (15 points). Let's call the version of your agent turned in for Assignment 3 "V1," and the version you turn in for Assignment 3B "V2." Then you can gain points as follows.

(i) If V1 cannot play Cassini (probably because of an array index out of bounds error when playing on a non-square board), fix this.

(ii) If V1 does not block threats posed by there being $k-2$ opponent-occupied squares in a line, then V2 should do so (unless it can immediately win, instead). In most cases, this can probably be fixed by making sure that your static evaluation function looks for these formations explicitly. You may be able to achieve the same aim by reliably blocking even shorter lines of opponent pieces.

(iii) Some V1 programs failed to choose a winning move, preferring to block an opponent even when a direct win was available. If your V1 program does that, then your V2 program should not.

(iv) If V1 exceeds the clock when playing any games on the Zobrist server, then V2 should not. This is normally fixed by checking the clock frequently during search, using iterative deepening, and returning the best move found so far when the clock is close to running out. If you did not implement iterative deepening in V1, then you should do so in V2.

To receive points here, make improvements as follows. Unless your agent already handles these four items, do all of them (15 points). If your agent already does all of them, you can still receive 5 points for making an "unconstrained improvement" (any playing-related improvement to your program) and describing it in the opening comment area of your code file. If your agent is missing one of these four features, fix that one and make one unconstrained improvement for 10 points. If your agent is missing two of these features, fix both, make an unconstrained improvement, and you can get all 15 points. If your agent is missing three of these features, just fix them for the full 15 points. No points will be awarded if your agent still has any of the four issues listed above.

2. Increase the variety and appropriateness of utterances made by your agent during typical games (10 points).

Appropriateness should take into consideration the character or personality of your agent, as described in its "introduction" at the beginning of the game as well as the state of the game, the dynamics of the game (how the state is changing), and possibly the human-like quality of the utterance. Some V1 programs seemed to have the potential to make highly varied utterances, but failed to do so during play because the remarks were controlled only by which player was in the lead, which did not change frequently during a single game. You can earn 5 points each for up to two of the following: (a) a new response pattern, with at least 3 variations in its wording, that is based on the dynamics of the

game—a change in the relative advantage of one player over the other, from one move to the next, or over a series of moves, or (b) three new variations on the wording of information provided in an existing response pattern in your agent, or (c) a response pattern that re-expresses your agent’s character at reasonable times (i.e., not every turn, and not in an obviously repetitive way), or (d) some other new response pattern that points out an interesting feature of the current state.

3. “Second round” – After you have completed improvements in 1 and 2, above, participate in a new round of competition involving a new partner and a new kind of K-in-a-Row game, “Linear Culture.” Your new partner must satisfy these constraints: (a) he or she is not yourself, and (b) is not the author of an agent you used for either of the transcripts you turned in for Assignment 3. The new type of game, “Linear Culture,” uses a 12 by 12 board in which there are not only some forbidden squares, but also some squares have been “contaminated” with Os and Xs. A typical game might involve these points of contamination growing like cells of a bacterial culture on a Petri dish. We can expect somewhat line-like patterns of growth to occur, since the object of the game is to get 6 in a row.

Your program need not win in this second round in order for you to get credit for it. However, winners of the second round will be permitted to progress to the third round. A winner is a program that wins both its games (one as X and the other as O).

4. “Third round” -- The winners of the second round will compete in this third round. A small number of extra points will be awarded to the programs that compete in this round. If a single overall winner emerges from this round, the tournament is done. Otherwise, additional rounds will be organized to determine an overall winner. A few additional extra credit points will be awarded the top three players. In addition the winner and runners up will gain fame within the class. You need not do anything special here. If you are a double winner from the second round, as evidenced by your transcripts, your program will be entered by the teaching staff into the third round.

5. Best utterances. We'll run a competition for best utterances independent of success in winning games. This will probably be done by having each member of the class cast some number of votes and tallying up the votes (actually, letting WebQ tally up the votes). A few extra credit points would be awarded to the top vote-getters, and they would also become famous. The utterances might be taken from games of 5-in-a-row on 7 by 7 board with corners forbidden, so that the games are not too long. (BTW, we are still open to suggestions for new versions of K-in-a-Row with Forbidden Squares.)

What to turn in:

A. Code. Use the same file name as you used for V1 in Assignment 3. Your code should begin with a multiline comment of this form:

```
''' myUWNNetIdKINAROW.py by Jason McDonald, CSE 473, Spring 2010, University of Washington.  
Version 2, May 21.
```

IMPROVEMENTS:

I have made the following improvements since Version 1:

--Fixed bug that prevented playing on non-square boards.

--Changed my code to check the clock after every 10 static evals to avoid overrunning the clock.

V1.1

--Added code to ensure blocking when the opponent threatens to win.
--Added five variations on my basic utterance form to provide greater interest during each game.
--Added two new utterance forms with their own variations, to report on game dynamics and remind observers of my compelling personality.

TESTING HISTORY:

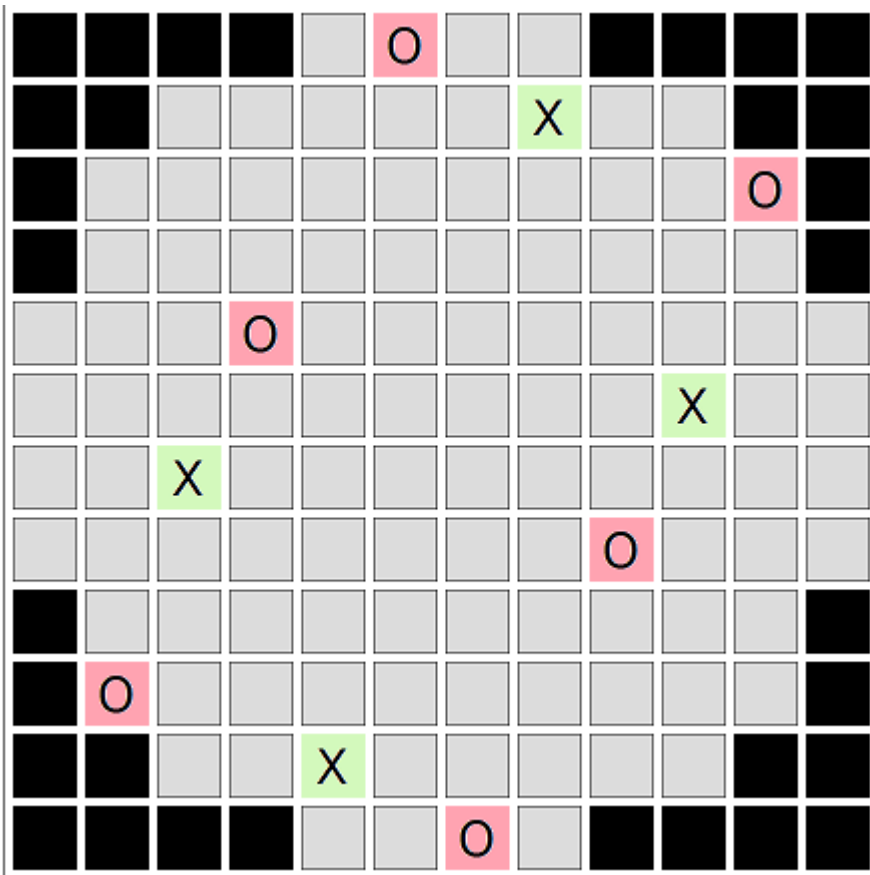
My testing history includes:

V1 tested playing X against the agent of Mary Vaughn (mine lost) and O against the same agent (lost again). The game was Five-in-a-Row on 7 by 7 Board with Corners Forbidden. The games went to 22 moves and 36 moves, respectively.

V2 tested playing X against the agent of Derek Jones (mine won) and O against the same agent (drew). The game was "Linear Culture". The games went to 63 moves and 54 moves, respectively.

'''

B. Transcripts. Turn in a transcript of two games: one with your agent playing X against your new partner's agent, and one with your agent playing O against the same agent. The games should both be instances of the new game "Linear Culture."



Initial board layout for "Linear Culture." The board is shaped somewhat like a Petri dish, and is "pre-contaminated" with some cells that might grow into larger clusters, with an obvious bias towards linear forms. O has an initial advantage in numbers, but some disadvantage in position, and in having to go second.