

CSCI 373.002 – Artificial Intelligence

Othello Project

Project Objectives:

1. Students obtain experience representing knowledge.
2. Students will experiment with heuristic development.
3. Students will discover the problems, benefits, and various methods of adversarial search.
4. Students will have the experience of completing a fairly large scale project with a very short deadline.

Othello -- The Game:

Materials (and beings) required.

1. An 8 x 8 square board (64 squares).
2. 64 bi-color disks (one side black, the other white).
3. 2 players.

Objective.

To end the game with more of your disks on the board than your opponent.

Starting Game.

1. Players determine colors. Black moves first.
2. White pieces on d4 and e5, Black pieces on d5 and e4.

Legal Moves.

Place a disk in a free square. At least one of your opponent's disks must lie in a horizontal, vertical, or diagonal line between one of your existing disks on board and the square to which you wish to move. Your opponent's disks that are "caught" between one of your existing disks and your newly placed disk are changed to your color.

Rules.

1. Board is 8 x 8; columns labeled a-h from (left to right); rows labeled 1-8 from (top to bottom); moves and cells are defined by column and row. Examples: d5, f8.
2. If you can not make a legal move, you must pass.
3. You can not pass if you have a legal move.
4. When neither player can make a move, the game ends.
5. Each player has 10 minutes of wall-clock time for entire game. If player takes more than allotted time, he/she forfeits game.
6. If a player attempts to make a wrong move, he/she forfeits the game.
7. The player with the most disks on board wins.

Othello -- Your implementation:

General Instructions.

You are to write a C, C++, or Java program that will play Othello according to the above rules. Your program will be called by a referee program created by the instructor.

Implementation Specifications.

1. Please create the following directory path in your account:
CSCI373AI.Spring2016/Projects/Othello

Place all of your project work (with subfolders) in this directory.

2. Program Input. Your program should accept the following as input:

I B -- Inform program to initialize and play as BLACK
I W -- Inform program to initialize and play as WHITE

B c r -- Inform program that BLACK moves to column c and row r.

Example: B a 1 means Black moves to position a1

B -- Inform program that BLACK passes

W c r -- Inform program that WHITE moves to column c and row r.

W -- Inform program that WHITE passes

C string -- A comment has been made. Referee is to ignore!!

n -- Other program claiming end game!!! Check it out!!!
n is the number of black pieces on board.

3. Program output.

R B -- Indicate program ready to play as BLACK
R W-- Indicates program is ready to play as WHITE
B c r -- BLACK moves to column c and row r. Use this format if your agent is to play as BLACK.

Example: B a 1 means Black moves to position a1

W c r -- WHITE moves to column c and row r. Use this format if your agent is to play as WHITE.

B -- BLACK passes
W -- WHITE passes

C string -- A comment has been made. Ignore!!

n -- Other program claiming end game!!! Check it out!!!
n is the number of black pieces on board.

4. Please document your modules well. Give brief statements about a module's function. Give "English" definitions of input variables. Define exactly what is to be returned by a function (if anything is to be return.) Documentation is extremely beneficial on your evaluation function. Also, document your choice of representations -- board, moves, directions, etc.
5. Write a technical report -- Discuss your choice of representations, search methods, and heuristics. Discuss problems encountered. Analyze tournament results. Report due by April 25, 2016

Othello -- Deadlines:

Jan 25	Algorithm and Representations of board and moves completed.
February 1	Agent plays a legal game of Othello with Referee.
March 4	Test Round. You must have an entry by 11:59pm .
April 6	Tournament. You must have an entry by 11:59pm .
April 25	Synopsis

Othello -- The Tournament

1. The tournament begins March 4. There will be two rounds. The test round will be October and the final round on April 6. You may make changes to your program between the test and final rounds. You may challenge each other prior to the tournament.
2. To enter tournament:
 - a. Place source projects in your directory.
 - b. Create jar file contain byte code. C and C++ programmers please include a Make file. Entries with syntax errors and certain run-time errors will not be accepted. Please grant others execute permission on all tournament directories and script files below in instructor's test directory. The instructor does not think the read permission will be needed.
3. Tournament results will be posted via Moodle.
4. You may change your entrant at anytime. Just insure that your entrant has no syntax or runtime errors.
5. Winners will be determined by the round robin round on April 6.

Othello -- Evaluation & Motivation

This project counts 15% of your course grade. Grading will be based on the following:

Points (150 total)	Task
20	Algorithm. 3% subtracted for each day late.
30	Plays legal Othello. Program does not make invalid moves, updates board appropriately, and provides an interface that interacts with the instructor's Referee.
10	Documentation and Style.
15	Search method and progressive deepening
15	Evaluation Function
10	Timing Implementation
25	Test Plan
25	Synopsis