BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

CSE 402 (Artificial Intelligence Sessional), July 2016 Term

ASSIGNMENT 3: Adversarial Search

Implementing AI agents for two player games

In this assignment you will implement an Alpha-Beta pruning based agent to play different two player games. Alpha beta pruning is a kind of adversarial search. For details on adversarial search and alpha beta pruning refer to 5.1 – 5.4 of your text book (Artificial Intelligence A modern approach, 3rd edition) and the provided material (Game Playing.pdf).

As the games you will be solving have very large depths, you will need to truncate the search at a reasonable depth and use a heuristic to evaluate the non-terminal state. The heuristic will estimate the utility value of the state. Details can be found in 5.4.1-5.4.2.

There can be found some variations of the Alpha-Beta pruning algorithm. You must implement the one outlined in Figure 5.7 of your text book and limit your search to a fixed depth. You can refer to "pseudo.txt" for a simple pseudocode.

A. Tasks

1. You need to implement a human agent and an Alpha-Beta pruning agent with depth limit to play two player games as follows:

Subgroup	Game
A1, B1	Checkers/Draughts
A2, B2	Reversi/Othello

2. Since there are variations in the rules of both the games as played across different countries and continents, you can choose any of the rule-sets during implementation.

3. You must use the provided Java framework and extend the needed classes to complete the tasks. Specifically you will need to extend two abstract class: Agent and Java. The implementation details can be found in the java files. As an example, an implementation of the game Tic-Tac-Toe using the given framework is also provied. However, note that for Tic-Tac-Toe, the game tree has been explored to full depth and thus no evaluation/heuristic function was required. But, for your assigned games, you need to devise an

evaluation/heuristic function to determine the utility value at any given depth. You can take help from Internet regarding this. Also, you will have to test your algorithm with different depths to find a value that gives calculates a “good” move in a “reasonable” amount of time.

4. You must implement GUI for this assignment. There must be provision for playing both Human vs. Computer (AI agent) and Computer vs. Computer where you AI agent will play against itself.

B. Report

You need to submit a report related to this assignment. The report should contain the following items.
1. Rules of the game you have implemented.
2. Heuristic you have used. You are encouraged to combine multiple heuristics in your static evaluation function.

C. Marks Distribution

Category	Percentage
Implementation of Alpha-Beta pruning and the game	30%
Heuristic Function	25%
GUI	20%
Overall program and understanding of the algorithm	20%
Report	5%

D. Submission Deadline:

1. Section A2, B2: November 22, 2016
2. Section A1, B1: November 29, 2016

E. Reference

1. Checkers
    a. Online Game Links: http://www.247checkers.com/
    b. Rules: https://en.wikipedia.org/wiki/Draughts
2. Reversi
    a. Online game links: http://www.web-games-online.com/reversi/
    b. Rules: https://en.wikipedia.org/wiki/Reversi