Project 1 – AI Algorithm for Reversi

1 Overall Description

Reversi is a relatively simple board game. Players take turns placing pieces on the board with their assigned color facing up. During a play, any piece of the opponent's color that is in a straight line and bounded by the piece just placed and another piece of the current player's color are turned over to the current player's color. The object of the game is to have the majority of pieces turned to display your color when the last playable empty square is filled.

In this assignment, we use the default board of size 8*8 board (administrators can modify the settings as needed). Students need to implement the AI algorithm of Reversi according to the interface requirements and submit it to the system as required for usability testing, points race(积分赛), and round robin.

The Project is divided into three phases：

	Evaluation Rule	DeadLine
Lab1	Score according to the number of test cases passed	2020/09/30 (fixed)
Lab2	Score according to the ranking in the points race	2020/10/17 (temporarily decided)
Lab3	Score according to the ranking in the round robin	2020/10/24 (temporarily decided)

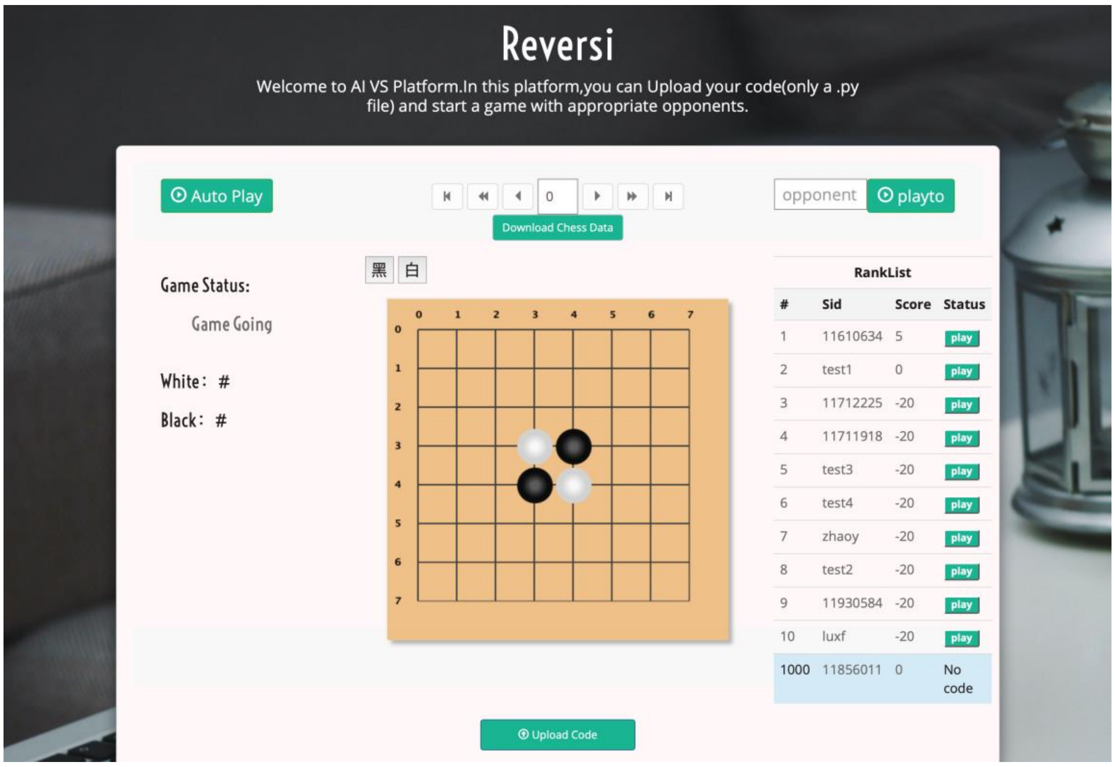
After Lab3, a carefully-written experiment report need to be submitted.

Coding_Score =（Lab1+Lab2+Lab3）/3

Project1_Score = Coding_Score *0.7+ Report_Score *0.3

2 The Use of the Platform

The Reversi platform ********** is logged in with the student ID and password. The default password is the student ID. At the first login, the system will remind you to change the password. After logging in successfully, you can see the below interface.



Reversi

Welcome to AI VS Platform.In this platform,you can Upload your code(only a .py file) and start a game with appropriate opponents.

Game Status: Game Going

White: #

Black: #

RankList

#	Sid	Score	Status
1	11610634	5	play
2	test1	0	play
3	11712225	-20	play
4	11711918	-20	play
5	test3	-20	play
6	test4	-20	play
7	zhaoy	-20	play
8	test2	-20	play
9	11930584	-20	play
10	luxf	-20	play
1000	11856011	0	No code

Now, you can submit your own AI algorithm to the Reversi battle platform. The platform will first do usability test after submission. The submission is successful only if your AI algorithm pass the usability test. After your AI algorithm is submitted successfully, you can click on “Auto Play” to challenge the player who ranks ahead of you for a PK. In order to avoid the first-hand advantage, the PK is played for 2 rounds with each other starting the game first. In each round, if one of your wins, then its score is increased by 5 points. If one of you loses, then its score is reduced by 5 points. If it is a draw, the scores remains unchanged.

The whole battle process will be recorded for each match. You can play back the game you just experienced by playing and backing buttons, or you can download the game data as a text file so that you can debug or review their own code and algorithms. On the right side you can see the leaderboards, showing only the top ten and their points, as well as your ranking and points. Click on “play” to see the live broadcast for the battle of the top-ten players. If you want to evaluate your newly uploaded algorithm, please use the function of “playto”. Just input the opponent you want to challenge and click “playto”, then you can play a pre-PK with this opponent. The pre-PK does not affect your rankings. The “playto” function is forbidden in the points race phase to avoid excessive parameter tuning.

The ranking in the points race is given according to the scores obtained after the above battles.

After the Lab3 DDL, the round robin is started. Every student will play a PK with each other student. The score is accumulated and the ranking for each student is given according to the final points.

3 Code Requirements

1、Python version: 3.6+

2、Code template:

```
import numpy as np
import random
import time

COLOR_BLACK=-1
COLOR_WHITE=1
COLOR_NONE=0
random.seed(0)
#don't change the class name
class AI(object):
    #chessboard_size, color, time_out passed from agent
    def __init__(self, chessboard_size, color, time_out):
        self.chessboard_size = chessboard_size
        #You are white or black
        self.color = color
        #the max time you should use, your algorithm's run time must not exceed the time limit.
        self.time_out = time_out
        # You need add your decision into your candidate_list. System will get the end of your candidate_list as your decision .
        self.candidate_list = []


    # The input is current chessboard.
    def go(self, chessboard):
        # Clear candidate_list, must do this step
        self.candidate_list.clear()
        #==================================================================
        #Write your algorithm here
        #Here is the simplest sample:Random decision
        idx = np.where(chessboard == COLOR_NONE)
        idx = list(zip(idx[0], idx[1]))
        #==============Find new pos========================================
        # Make sure that the position of your decision in chess board is empty.
        # If not, the system will return error.
        # Add your decision into candidate_list, Records the chess board
        # You need add all the positions which is valid
        # candidate_list example: [(3,3),(4,4)]
        # You need append your decision at the end of the candidate_list,
        # we will choose the last element of the candidate_list as the position you choose
        # If there is no valid position, you must return a empty list.
```

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Note：**import os** not allowed to use

4 Requirements in Each Phase

4.1 Lab1

Usability testing: In this test, we will use some simple board test cases where students need to find all the places to drop. Only jobs that pass the usability test can pass. This is to prevent students from submitting code including illegal operation, infinite loop or random drop. The usability testing includes: the os package cannot be imported in the code file to prevent the student code from destroying the operation of the system.

A total of 10 test cases were prepared, each with 10 points, and the scores were determined by the number of test cases passed.

4.2 Lab2

Points Race: Students who pass the usability test can participate in the points race. The specific competition rules are as follows: Students can submit their AI algorithm to the Reversi battle platform (it is a successful submission if it passes the usability test). After a successful submission, you can click on "Auto Play" to challenge the player who ranks ahead of you for a PK. In order to avoid the first-hand advantage, the PK is played for 2 rounds with each other starting the game first. In each round, if one of your wins, then its score is increased by 5 points. If one of you loses, then its score is reduced by 5 points. If it is a draw, the scores remains unchanged. In this phase, "playto" is forbidden to avoid excessive parameter tuning.

Students can submit and update their AI algorithm to the Reversi battle platform before Lab 2 DDL. After Lab 2 DDL, the scores are given according to the ranking of the points

4.3 Lab3

Round-Robin Stage： After the Lab3 DDL, the round robin is started. Every student will play a PK with each other student. The score is accumulated and the ranking for each student is given according to the final points.