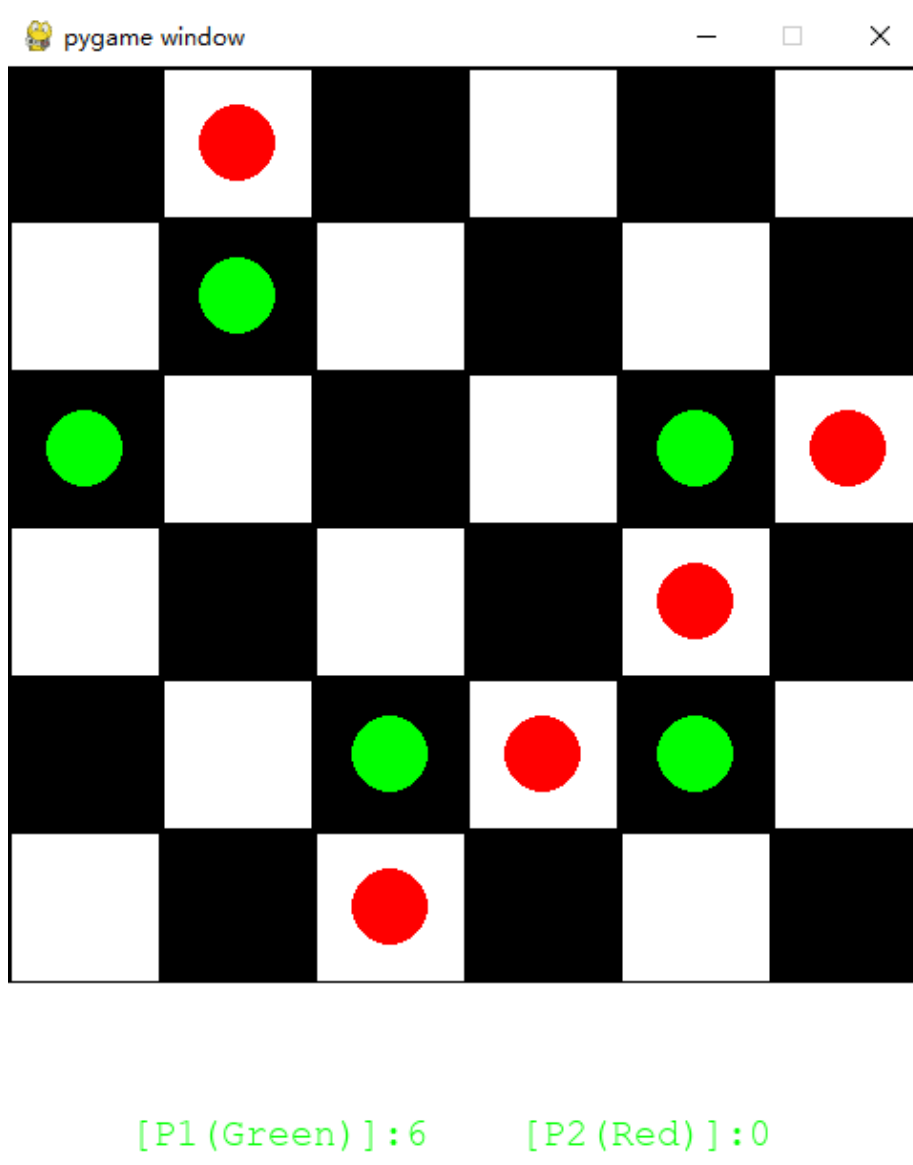


CS4386 Assignment 1

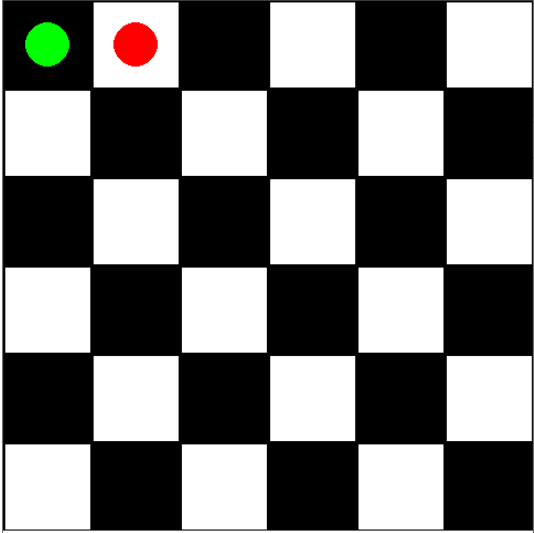
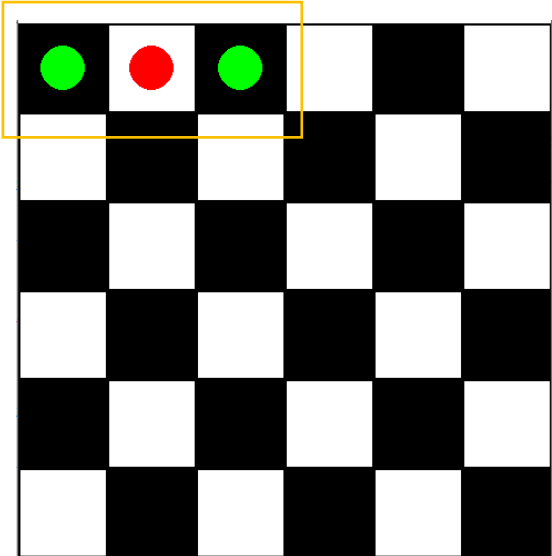
1 Game Rules

There are two players in this game. In each turn, a player can put a chessman in the specified empty cell of the 6*6 board (player 1 is only allowed to put it in the black box, and player 2 is only allowed to put it in the white box). Any player who can connect 3 or 6 adjacent chessman (color does not matter) in a row/column (**no diagonal**) will get 3 or 6 points respectively. The game ends when all the cells are taken by players and the player who gets higher points is the winner.



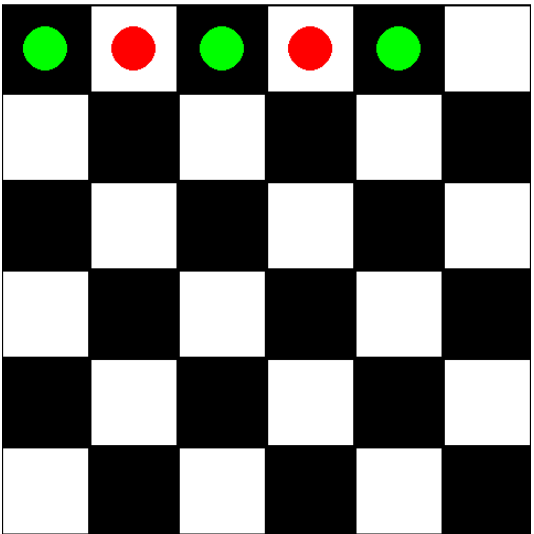
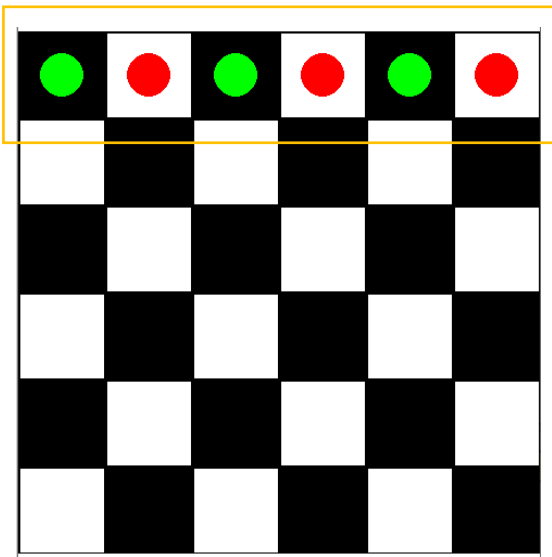
Case 1-4 illustrate the rules of this game (Player 1 is denoted by green and Player 2 is denoted by red).

Case 1:

Step i	Step i+1
	

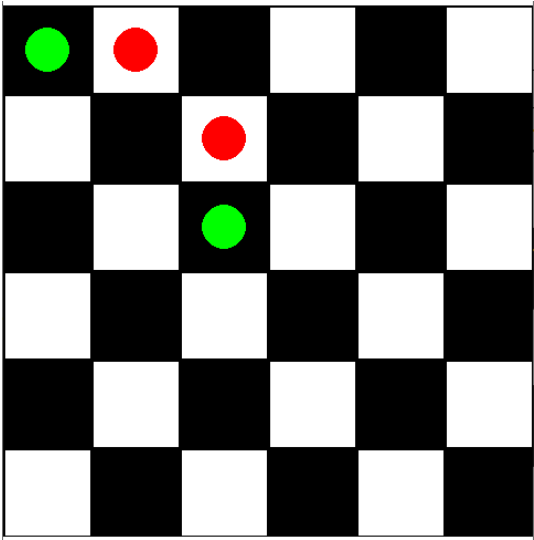
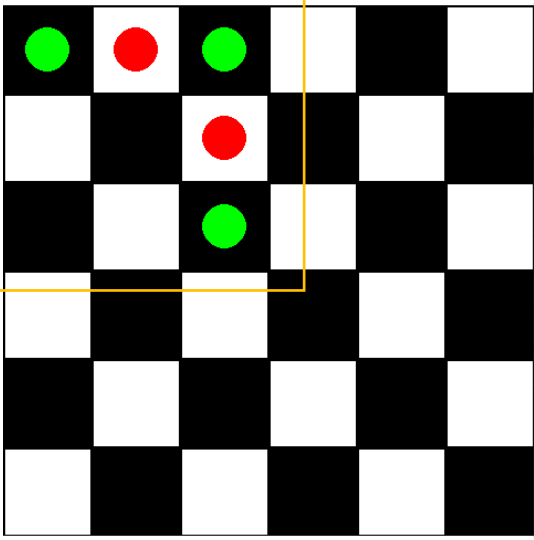
In this case, player 1 will get 3 points in step i+1 since he connects 3 adjacent chessman.

Case 2:

Step i	Step i+1
	

In this case, player 2 will get 6 points in step i+1 since he connects 6 adjacent chessman.

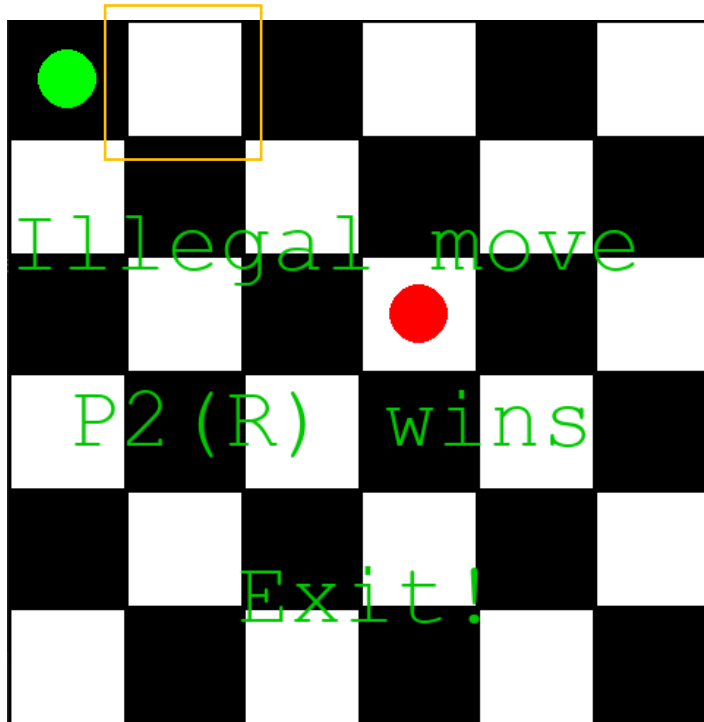
Case 3:

Step i	Step i+1
	

In this case, **player 1** will get $3+3=6$ points in step $i+1$ since he connects 3 adjacent chessman both in row and column.

Case 4:

In each turn, a player can put a chessman in the specified empty cell of the 6*6 board (player 1 is only allowed to put it in the black box, and player 2 is only allowed to put it in the white box). If the player puts the chessman in the wrong cell, he will lose the game.



In this case, **player 1** wants to put it in white cell. It is an illegal move, so he lose the game.

2 Demo codes

Github Link: https://github.com/zwebzone/CS4386_A1_forALL

Same code can be also found in Canvas (Files > Assignment1>CS4386_A1_forALL.zip)

Note: We will keep improving the demo codes and release the updated ones on Github, which will not be much different from this version. Hence, you can start implementing your AI based on this version **now**. Meanwhile, if you find any bugs in our demo codes, you can ask questions on Github issues and we will fix them.

How to Run

To run the demo codes, you need to install python3.6 first. The environment tutorial can refer to [Appendix: Environment Tutorial](#) (the last two pages).

We support 3 languages for implement your AI: C++, JAVA and Python. Python is the easiest one to implement since our server program is written in Python. Hence, we **highly recommend** you to use Python. If you are not familiar with Python, you can use Java or C++.

Mode1 Human VS AI

1. If your AI is implemented by C++:

```
cd cpp
g++ AIPlayer.cpp -fPIC -shared -o aplayer.so
cd ..
#if you want the Human play first, use
python3 game.py Human CPP 1
#if you want the AI play first, use:
python3 game.py Human CPP 2
```

2. If your AI is implemented by Java:

```
cd java
javac AIPlayer.java
mkdir com
mv AIPlayer.class com
jar cvf AIPlayer.jar com
cd ..
python3 game.py Human JAVA 1
```

3. If your AI is implemented by Python:

```
python3 game.py Human PYTHON 1
```

Mode2 AI vs AI

```
#if you want the JAVA AI play with PYTHON AI
python3 game.py JAVA PYTHON 1
#if you want the PYTHON AI play with PYTHON AI
```

How to implement your AI algorithm

Take the python version for example, you need to modify the **get_move()** function in AIPlayer.py.

```
def get_move(self, state, player):
    # implement your algorithm here
    games = self.available_cells(state, player)
    random_move = random.choice(games)
    # the end of your algorithm
    return random_move
```

The example returns a random move, and you should modify it using your own algorithm. If your AI fails to return a move in a long time (e.g. **10 seconds per turn**), your opponent will win the game.

You can define your own variables and functions in the AIPlayer Class, but you cannot delete existing variables or functions in AIPlayer Class. Meanwhile, you cannot change the function parameters of get_move() function. Note: When implement your AI, you **MUST NOT** change game.py or gui.py.

3 Scoring Scheme and Requirements

Total (20 scores) = Performance of your AI + codes + report

Note: Performance of your AI = whether you win the game (10 points for winner and 0 for loser) + your obtained points. In addition to the points you win against others, we will also grade you based on the quality of your algorithm.

1. Requirement for the codes:

- At the beginning of your file (AIPlayer.cpp or AIPlayer.java or AIPlayer.py), add the following comments to your code: (replace / to # in python code)

```
////////////////////////////////////
// CS4386 Semester B, 2022-2023
// Assignment 1
// Name: [Your name]
// Student ID: [Your student ID]
////////////////////////////////////
```

- You only need to submit the folder for the language of your choice and directly zip it to a **.zip** file. We put a submission example in Canvas for your reference.

pycache	2023/2/10 15:20	文件夹	
cpp	2023/2/16 22:45	文件夹	
java	2023/2/16 22:57	文件夹	
python	2023/2/9 22:13	文件夹	
.DS_Store	2022/5/10 10:38	DS_STORE 文件	7 KB
game.py	2023/2/23 12:40	Python File	17 KB
gui.py	2023/2/10 15:17	Python File	5 KB

- Rename the zip file that contains the related files of your AI codes as **CS4386_2223B_[studentID].zip**, where [studentID] is your student ID. You need to submit this zip file to Canvas.

2. Requirement for the report:

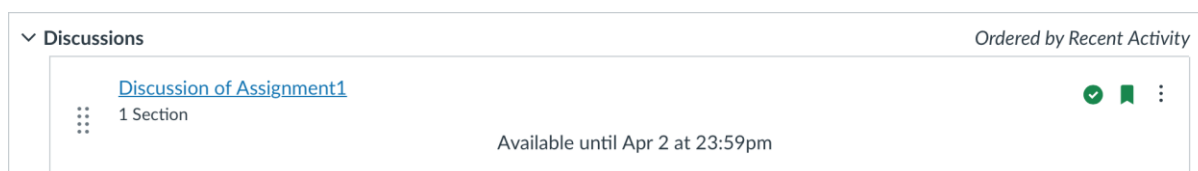
- You should write a report to explain your AI.
- At the beginning of the report, include the following information:
 - The heading “CS4386 Assignment 1 (Semester B, 2022-2023)”
 - Your name
 - Your student ID
- You should then describe your algorithm as clearly as possible. Feel free to use examples and add screenshots or other figures if it can help better illustrate your method.
- **If you adopt some part of your code from somewhere, you must fully acknowledge this and provide a reference to where you obtain the code. You must declare how much of your submitted code is obtained from someone/somewhere else and how much is indeed written by you.**
- At the end of your report, include the related references from where you have gathered useful information in working on your assignment
- Convert your report to a PDF file with the file name **CS4386_2223B_[studentID].pdf**, where [studentID] is your student ID.
- You need to submit this report together with your source code to Canvas.

3. Submission

Submit both **CS4386_2223B_[studentID].zip** and **CS4386_2223B_[studentID].pdf** to canvas.

4 Q&A

We have created a discussion on CANVAS. You can ask questions there and the TAs will check it everyday and answer your questions as soon as possible.



5 Deadline

The DDL for this assignment is **17th March**.

Appendix: Environment Tutorial

We suggest you to use anaconda to run this assignment. And here are 4 steps for you to run Assignment2.

Step1 install anaconda

You can download anaconda3 from <https://repo.anaconda.com/archive/>
Anaconda3-5.2.0 contains Python3.6 and we suggest you to download this version.

In the following, we take the windows users for example since the case is more complex compared with Linux/MacOS users. For windows users, you can download Anaconda3-5.2.0-Windows-x86_64.exe.

Anaconda3-5.2.0-Linux-ppc64le.sh
Anaconda3-5.2.0-Linux-x86.sh
Anaconda3-5.2.0-Linux-x86_64.sh
Anaconda3-5.2.0-MacOSX-x86_64.pkg
Anaconda3-5.2.0-MacOSX-x86_64.sh
Anaconda3-5.2.0-Windows-x86.exe
Anaconda3-5.2.0-Windows-x86_64.exe

After downloading it, you can install anaconda3 by double clicking the .exe file and remember the installation path (you can refer to <https://zhuanlan.zhihu.com/p/61639212>). After installation, you need to check that your environment path contains the path of anaconda.

Then you can open the anaconda prompt:



You can use the following command to see the version of anaconda3:

```
conda --version
```

```
(base) C:\Users\xychong2\Downloads\CS4386_assignment2-main\CS4386_assignment2-main>conda --version  
conda 4.5.4
```

Step2 create env

You need to create an environment for running this assignment. The command is:

```
conda create -n cs4386 python=3.6
```

```
Anaconda Prompt
(base) C:\Users\xychong2\Downloads\CS4386_assignment2-main\CS4386_assignment2-main>conda create -n cs4386 python=3.6
Solving environment: done

==> WARNING: A newer version of conda exists. <==
  current version: 4.5.4
  latest version: 4.12.0

Please update conda by running

    $ conda update -n base conda

## Package Plan ##

  environment location: C:\Users\xychong2\AppData\Local\Continuum\anaconda3\envs\cs4386

added / updated specs:
- python=3.6

The following packages will be downloaded:

package                        | build                | size
-----|-----|-----
sqlite-3.38.0                  | h2bbff1b_0          | 1.2 MB
wheel-0.37.1                   | pyhd3eb1b0_0        | 31 KB
-----|-----|-----
Total:                          |                      | 1.3 MB

The following NEW packages will be INSTALLED:

certifi: 2021.5.30-py36haa95532_0
pip: 21.2.2-py36haa95532_0
python: 3.6.13-h3758d61_0
setuptools: 58.0.4-py36haa95532_0
sqlite: 3.38.0-h2bbff1b_0
vc: 14.2-h21ff451_1
vs2015_runtime: 14.27.29016-h5e58377_2
wheel: 0.37.1-pyhd3eb1b0_0
wincertstore: 0.2-py36h7fe50ca_0

Proceed ([y]/n)? y

Downloading and Extracting Packages
sqlite-3.38.0 | 1.2 MB | ##### | 100%
wheel-0.37.1 | 31 KB | ##### | 100%
Preparing transaction: done
Verifying transaction: done
Executing transaction: done
#
# To activate this environment, use
#
#     $ conda activate cs4386
#
# To deactivate an active environment, use
#
#     $ conda deactivate
```

Then you can activate this env by:

```
conda activate cs4386
```

```
(base) C:\Users\xychong2\Downloads\CS4386_assignment2-main\CS4386_assignment2-main>conda activate cs4386
(cs4386) C:\Users\xychong2\Downloads\CS4386_assignment2-main\CS4386_assignment2-main>_
```

Step3 install packages

To install jpype1: pip3 install jpype1

```
(cs4386) C:\Users\xychong2\Downloads\CS4386_assignment2-main\CS4386_assignment2-main>pip3 install jpype1
Collecting jpype1
  Using cached JPype1-1.3.0-cp36m-win_amd64.whl (361 kB)
Collecting typing-extensions
  Using cached typing_extensions-4.1.1-py3-none-any.whl (26 kB)
Installing collected packages: typing-extensions, jpype1
Successfully installed jpype1-1.3.0 typing-extensions-4.1.1
```

Same to install pygame: pip3 install pygame

Step4 run A1

You can use the provided commands to run this assignment: python3 game.py Human PYTHON 1