

Theory of Computer Games (Fall 2018) Final Project

National Taiwan University

Code Due Date: 09:00 (UTC+8), January 17, 2019
Report Due Date: 09:00 (UTC+8), January 18, 2019

- In the final project, you have to implement a Chinese Dark Chess (暗棋) agent.
- For the rule of Chinese Dark Chess, please refer to <http://www.iis.sinica.edu.tw/~tshsu/tcg/2018/hwks/rules.pdf>.
- Check your email for the password of the template code and CDC_interface.

Requirements

- Implement **NegaScout** algorithm.
- Implement **transposition table** by hashing. You're **NOT allowed** to use `struct hsearch_data`, `std::unordered_map`, `__gnu_pbds::gp_hash_table`, or other hash table libraries.
- Specify how to compile your code under **Windows** or **Linux** in the report.
- Your program is required to play a game normally via the given `CDC_interface`.

- Directory hierarchy:
 - [your_id] // e.g. b07902000
 - source // the directory contains your code
 - report.pdf
- Compress your folder into a **zip** file.
- Due to the server limitation, the file size is restricted to **2M** bytes.

Your report should contain but not limited to

- how to compile and run your code
- what algorithms and heuristics you've implemented
 - You have to give the **line numbers** of each of your algorithms / heuristics.
- the experiments you've done

- Final Score = Code Score + Report Score + Bonus
 - (Code Score + Report Score) $\in [0, 40]$.
 - You get Bonus if your tournament performance is considered good enough.
- Under the following circumstances, you will be graded **extremely low**.
 - You claim something you've done but actually you didn't.
 - Your program doesn't compile or run.
 - Your program can't play a game normally.
 - You didn't do anything and just upload the template code.

Swiss-System Tournament

- The following shows the procedure of the tournament:
 - 1: randomly match you with an opponent
 - 2: **while true do**
 - 3: play 2 rounds with your opponent; you two take turns to be the first player
 - 4: **if** the judge considers it sufficient to distinguish the top AIs **then**
 - 5: **break**
 - 6: **end if**
 - 7: match you with another opponent according to your record
 - 8: **end while**
- If you win/draw/lose in a round, you get 1/0.5/0 point.
- Suppose you get S points and your i -th opponent gets s_i points, then your score is given by $\text{std}::\text{pair}(S, \sum s_i)$.

- 一個程式一盤棋可用計算時間為900 秒， 超時立刻算輸。
- 三循環算和。
- 雙方連續 30 步皆無吃無翻算和。
- 單局犯規（輸出不合法步、程式不正常結束等）發生第二次立刻算輸。
- 裁判擁有所有棋局最終判決權以及犯規時棋局繼續方式的決定權。

- Refer to “暗棋對弈平台 _ 使用手冊 _windows.pdf” or “User manual of Chinese dark chess client_linux.pdf”.
- 思考模式
 - 讀檔模式
 - 讀 board.txt, 寫 move.txt。
 - 每下一步程式就會結束。
 - 背景模式
 - 透過 socket 讀寫。
 - 每下一步程式不會結束。
 - 每下完一場介面還是會砍掉你的程式。
- 目前不支援 local 對戰, 必須連 server。
- If you want two of your AIs to fight with each other, you have to create another folder that contains the GUI. Use one GUI to create the game room and let the other to join the room.
- 帳號/密碼：大寫學號。

Template Code

- The template contains
 - `main.cc`, `anqi.cc`, `anqi.hh`
 - `Protocol.h`, `Protocol.cpp`, `ClientSocket.h`, `ClientSocket.cpp`
- In most cases you only need to modify `main.cc`, `anqi.cc`, and `anqi.hh`.
- Compiler options:
 - The options `-static -s` should be enabled under all operating systems.
 - The option `-lwsck32` should be enabled under Windows.
 - Use `-D WINDOWS` to enable extra Windows-only feature.
- The template is encoded in big-5. You may convert it into utf-8 if you want.

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Template Code

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Protocal

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Protocal (x,y)

(0,7)	(1,7)	(2,7)	(3,7)
(0,6)	(1,6)	(2,6)	(3,6)
(0,5)	(1,5)	(2,5)	(3,5)
(0,4)	(1,4)	(2,4)	(3,4)
(0,3)	(1,3)	(2,3)	(3,3)
(0,2)	(1,2)	(2,2)	(3,2)
(0,1)	(1,1)	(2,1)	(3,1)
(0,0)	(1,0)	(2,0)	(3,0)

Frequently Asked Questions

- For MAC:
 - Q: Is there a GUI version for MAC?
A: Currently there is no MAC version.
- For Linux:
 - Q: What does “permission denied” mean?
A: Your “search” file needs to be executable.
 - Q: Why doesn't my GUI interface work?
A: Make sure to add `LD_LIBRARY_PATH=.` to include the `GameDLL.so`.
- Misc:
 - Q: Any hardware limit?
A: In the tournament, you need to prepare your own hardware. You can use a 18-core CPU, GPU, TPU, and so on. But **you need to support CPU-only mode** for testing purpose.