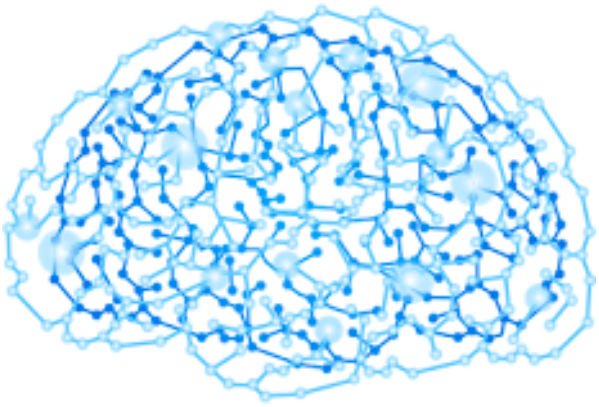
B5 - Artificial Intelligence

B-IAR-500

Gomoku

Smart Bots for a Simple Game



1.5

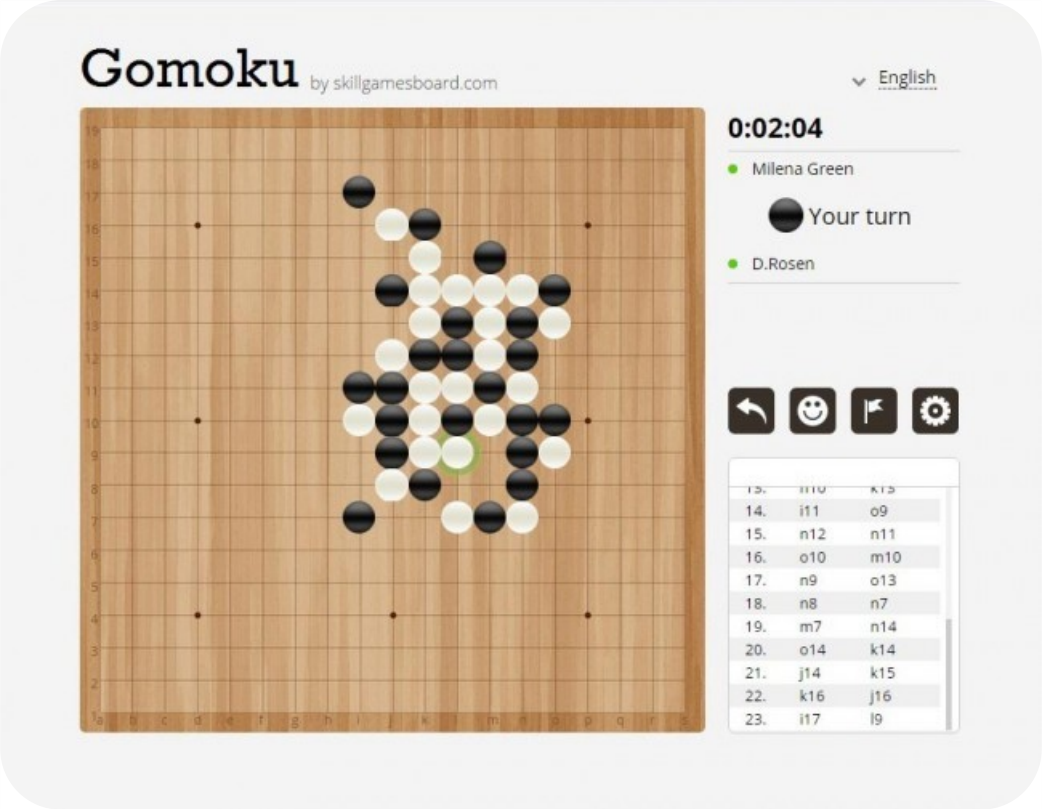
Gomoku

binary name:	pbrain-$GROUP_NAME.exe
group size:	2-3
repository name:	gomoku
repository rights:	ramassage-tek
language:	C, C++, C#, Java, Brainfuck, OCaml, Haskell.

- Your repository must contain the totality of your source files, but no useless files (binary, temp files, obj files,...).
- All the bonus files (including a potential specific Makefile) should be in a directory named *bonus*.
- Error messages have to be written on the error output, and the program should then exit with the 84 error code (0 if there is no error).

The goal of this project is to implement a *Gomoku Narabe* game bot (also called *Wuzi Qi*, *Slope*, *Darpion* or *Five in a Row*), focusing on the performance of its artificial intelligence.

Your bot must be usable in the software Piskvork. It must therefore implement its communication protocol, but **only the mandatory part**.



Feel free to implement an algorithm of your choice for your bot (Min-max, Monte-Carlo, Machine Learning or other).
You will be evaluated on the effectiveness of your bot, and on this criterion alone.

Piskvork is freely available on the Internet, as well as some bots. Challenge them to evaluate your bot's strength!

You will need to develop a rules management algorithm ; do not hesitate to enrich your board representation and your data structures to optimize this algorithm!

There are some technical constraints you must comply with:

- The name of the brain can contain only characters A-Z, a-z, 0-9, dash, underscore, dot.
  The name is required **to begin with prefix "pbrain-"**.
  (directly quoted from the protocol web page).
- Whatever development language you choose, your program must compile **on Windows** using the `cmake` command and produce an executable.
- **Only standard libraries are allowed.**

Game Rules

This is a 2-player game that is played on a 19x19 game board (called **goban**).
The rules of the game are as follows:

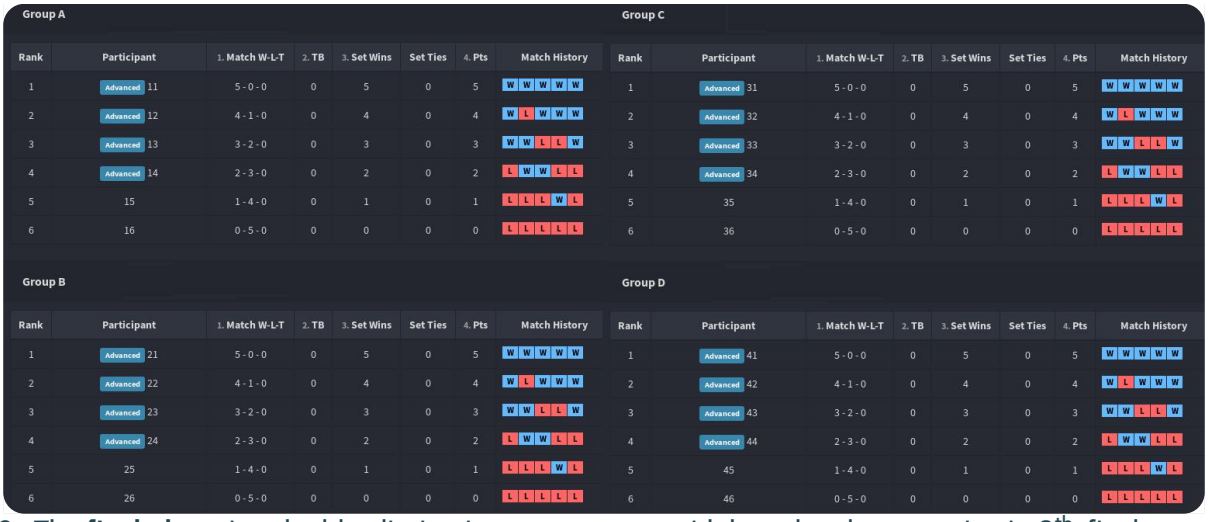
- the first player plays with black stones (in unlimited numbers), the second with white stones (in unlimited numbers as well);
- the first stone is placed anywhere on the goban;
- the players then alternately put one and only one of their stones a free intersection;
- the first player to align at least 5 stones (horizontally, vertically or diagonally) wins the round.

Grand Tournament

Your bot will be evaluated based on its results in actual game playing, via a 3-step tournament:

- **play-off**
  In order to participate in qualifiers, each bot must pass this phase by beating very basic AIs.
- **qualifiers** (regional)
  Pools are formed, grouping bots from the same city. All the bots inside a pool meet each other.
  The best bots of each pool qualify for the national championship.
- **championship** (national)

1. The **first phase** is a round-robin.
   All bots qualified in the championship are grouped into 4 pools.
   The top 4 bots from each pool participate in the final phase.



Group A

Rank	Participant	1. Match W-L-T	2. TB	3. Set Wins	Set Ties	4. Pts	Match History
1	Advanced 11	5 - 0 - 0	0	5	0	5	W W W W W
2	Advanced 12	4 - 1 - 0	0	4	0	4	W L W W W
3	Advanced 13	3 - 2 - 0	0	3	0	3	W W L L W
4	Advanced 14	2 - 3 - 0	0	2	0	2	L W W L L
5	15	1 - 4 - 0	0	1	0	1	L L L W L
6	16	0 - 5 - 0	0	0	0	0	L L L L L

Group C

Rank	Participant	1. Match W-L-T	2. TB	3. Set Wins	Set Ties	4. Pts	Match History
1	Advanced 31	5 - 0 - 0	0	5	0	5	W W W W W
2	Advanced 32	4 - 1 - 0	0	4	0	4	W L W W W
3	Advanced 33	3 - 2 - 0	0	3	0	3	W W L L W
4	Advanced 34	2 - 3 - 0	0	2	0	2	L W W L L
5	35	1 - 4 - 0	0	1	0	1	L L L W L
6	36	0 - 5 - 0	0	0	0	0	L L L L L

Group B

Rank	Participant	1. Match W-L-T	2. TB	3. Set Wins	Set Ties	4. Pts	Match History
1	Advanced 21	5 - 0 - 0	0	5	0	5	W W W W W
2	Advanced 22	4 - 1 - 0	0	4	0	4	W L W W W
3	Advanced 23	3 - 2 - 0	0	3	0	3	W W L L W
4	Advanced 24	2 - 3 - 0	0	2	0	2	L W W L L
5	25	1 - 4 - 0	0	1	0	1	L L L W L
6	26	0 - 5 - 0	0	0	0	0	L L L L L

Group D

Rank	Participant	1. Match W-L-T	2. TB	3. Set Wins	Set Ties	4. Pts	Match History
1	Advanced 41	5 - 0 - 0	0	5	0	5	W W W W W
2	Advanced 42	4 - 1 - 0	0	4	0	4	W L W W W
3	Advanced 43	3 - 2 - 0	0	3	0	3	W W L L W
4	Advanced 44	2 - 3 - 0	0	2	0	2	L W W L L
5	45	1 - 4 - 0	0	1	0	1	L L L W L
6	46	0 - 5 - 0	0	0	0	0	L L L L L

2. The **final phase** is a double elimination tournament, with loser brackets, starting in 8th-finals.

Tournament Rules

During the tournament, the rules are as follows:

- **5 seconds** maximum per move,
- **70 MB** of memory per bot,
- a forbidden move automatically leads to defeat,
- the qualifications and the round-robin of the national championship take place in **3 rounds**,
- the final phase of the championship takes place in **5 rounds**.